AUTOMOTIVE INDUSTRIES

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

NOVEMBER 1, 1950

In This Issue . . .

Automatic Devices Reduce Inspection Costs

Britain's Commercial Motor Show

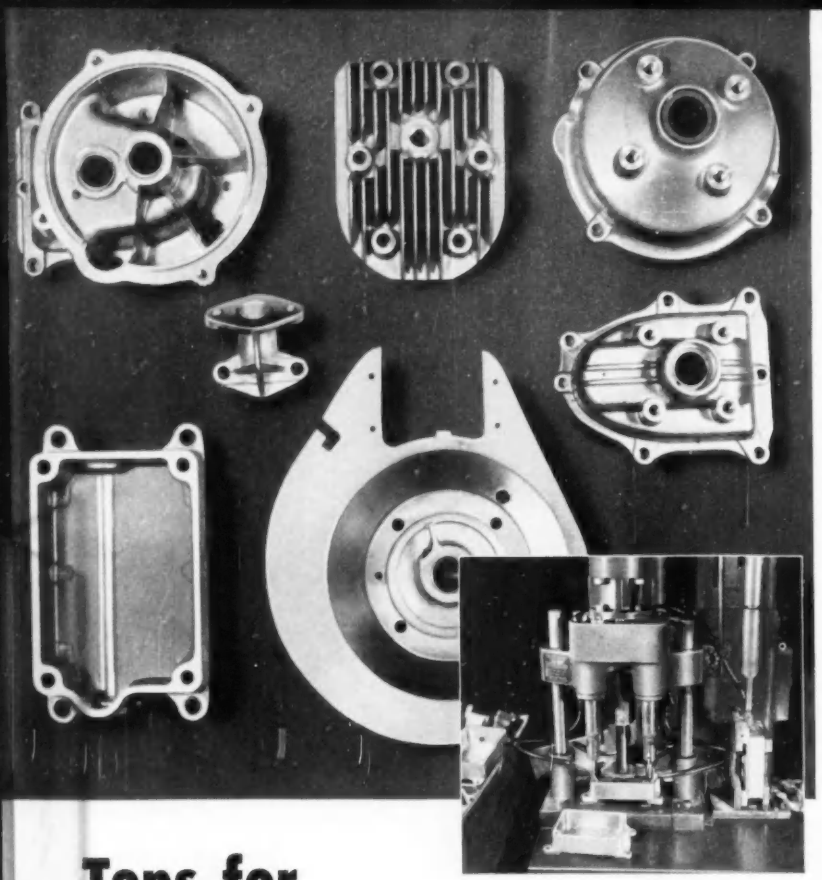
Studebaker's New Engine

De Soto's Eight Miles of Conveyors

Evaluating Fuels for High Compression Engines

Complete Table of Contents, Page 3

A CHILTON PUBLICATION



Tops for tapping aluminum . . .

FOR DRILLING and tapping operations on aluminum castings, a large midwest manufacturer wanted a cutting oil of light color and low viscosity that would give maximum tool life.

After testing various products, officials found the cutting fluid that fully met their specifications. It was STANICUT 62 FC Cutting Oil recommended for the job by a Standard Oil cutting oil specialist. It was tried in four machines.

A week's run convinced the plant superintendent and the machine operators that STANICUT 62 FC was the cutting oil for the job. *Tool life was double their expectations. Threads cut were smooth and clean. Washability was excellent; oil carry-away was negligible.*

The experience of this company indicates the savings you can make with STANICUT Cutting Oils, not only on aluminum jobs but on a wide variety of operations. You can profit further through the engineering service of a Standard Oil lubrication specialist. He is located within easy reach of your plant. How you can benefit by his on-the-spot service is explained at the right. Standard Oil Company (Ind.), 910 S. Michigan Ave., Chicago 80, Ill.

STANICUT 62 FC
TRADE MARK
Cutting Oil

What's YOUR problem?

W. J. Mackle, lubrication specialist at Standard Oil's Detroit office, helped this company solve a problem by recommending the product that exactly met the requirements of a special job.

He is one of a corps of Standard Oil lubrication specialists located throughout the Midwest to provide "on-the-spot" service to plant operators. One of these lubrication specialists is near your plant. He has plenty of practical experience and has been specially trained for his job in a Standard Oil Lubrication Engineering School. You can obtain his services quickly and easily. Just phone or drop a card, today, to the nearest Standard Oil Company (Indiana) office. When he calls on you, discuss with him the advantages of such outstanding products as:

STANICOOL HD Soluble Oil—Because they contain additional compounding, these heavy-duty soluble oils possess not only the cooling ability of an emulsion but also the ability to give better tool life and finer finishes than can be obtained with a conventional soluble oil.

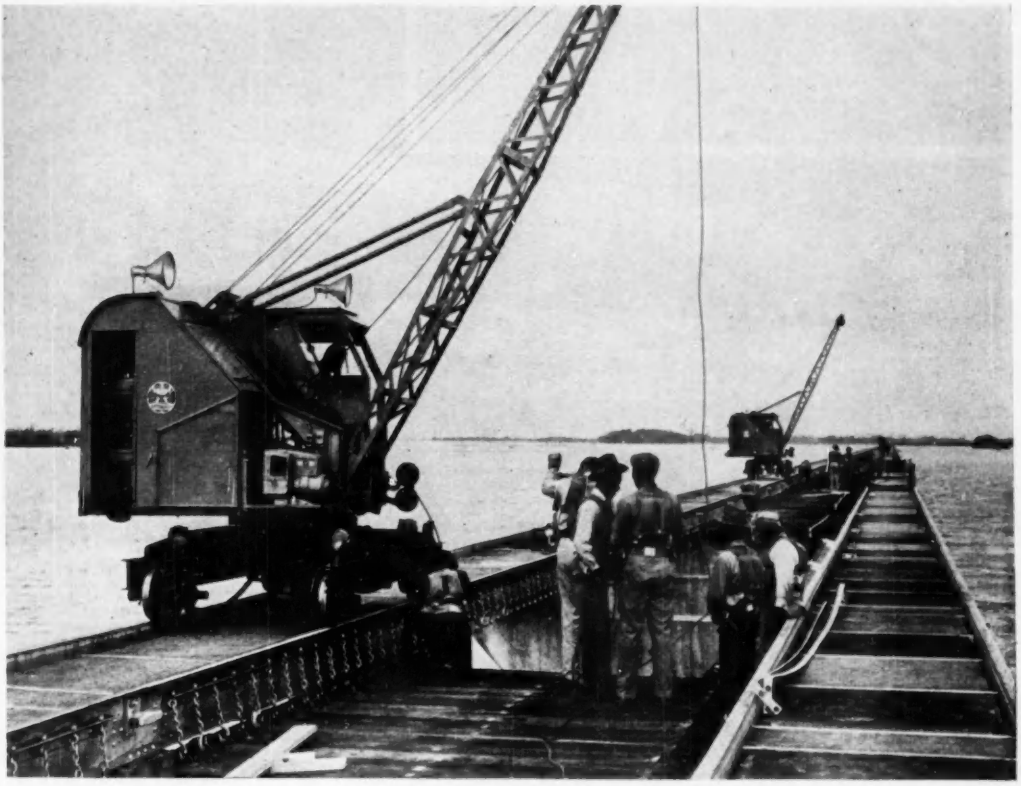
STANOSTAMP Compounds—Here are three established products for stamping or heavy drawing operations of either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical applications. STANOSTAMPS offer maximum protection for dies and work. These compounds can be readily removed in conventional washing equipment.

EUREKA Tempering Oil—From Standard Oil's complete line of quenching and tempering oils, this product is recommended for continuous use in tempering-oil baths at temperatures up to 525°F.

STANDARD OIL COMPANY (INDIANA)

STANDARD

"Little Giant"...six machines in one...
comes to Cotta for heavy-duty reduction unit



Consistent with the over-all ruggedness and dependability of its convertible unit, the Little Giant Crane and Shovel, Inc. of Des Moines, Iowa comes to Cotta for sure, smooth reduction of power from motor to operating parts. If you are planning a new design . . . or repowering old machinery . . . let us work with you on your transmission or power reduction requirements.

- **Cotta Reduction Units have a broad range of ratios**
- **Input Torque from 150 to 1350 foot pounds**
- **For use on cranes, shovels, rock crushers, generators, pumps, etc.**

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem — COTTA engineers will help you select the right unit for best performance. May we work with you?

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

An Assurance of Dependable Service

COTTA

HEAVY-DUTY REDUCTION UNITS

"Engineered-to-order"

LEFT HAND FRONT SIDE OF AMBULANCE INTERIOR. Notice the pure nickel shelf atop the instrument cabinet, the sterilizer of 18-8 chromium-nickel stainless steel, and the Monel® sink. This silvery-white equipment resists corrosion and remains easy to clean and keep clean.

New mobile hospital utilizes equipment made from Nickel Alloys

This new Disaster Ambulance comprises many innovations: full equipment for transporting eight or more patients at one time, complete medical supplies for treating firemen overcome by smoke or flames, facilities for administering oxygen to patients in 4 hospital-type beds . . .

And, significantly . . . its hygienic interior sparkles with an 18-8 chromium-nickel stainless steel sterilizer, a Monel sink, and a pure nickel shelf on the instrument cabinet . . . **all salvaged after 15 to 20 years service in a previous ambulance unit.**

Built for New York City, by The Flxible Company of Loudonville, Ohio, the modern mobile hospital, shown above, has side panels of 18-8 chromium-nickel stainless steel made by Budd Manufacturing Company. Heat treated nickel alloyed steels are used in its Spicer transmission and in its Timken rear axle unit.

Nickel-alloyed materials prove their dependability in all sorts of applications. From among the many standard grades available, it is possible to select the one which provides the best combination of properties for meeting virtually any reasonable demands. Send us details of your problems for our suggestions. Write us today.

EMBLEM OF INCO SERVICE

Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

Nov. 1, 1950 Vol. 103, No. 9

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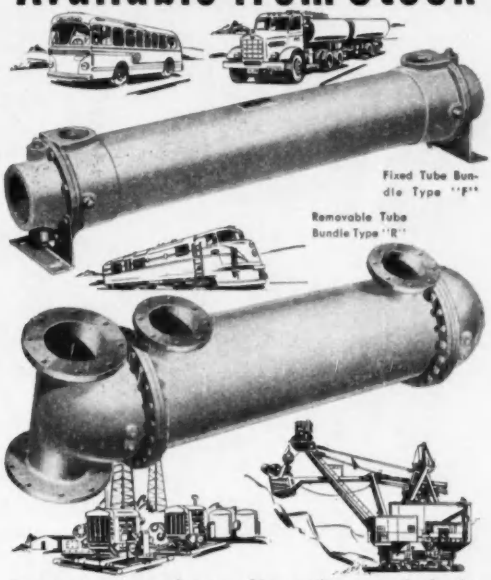
Now!

YOUNG Type "F"

HEAT EXCHANGERS

Available from Stock



Young, pioneer manufacturer of heat exchangers and other heat transfer products, now offers greater savings in initial and maintenance costs with its newly designed heat exchanger line. Corrosion-resistant Admiralty tubing, larger tube sizes, and engineered tube spacing and baffling mean longer service, easier maintenance. Coupon brings full details, without obligation.

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HEAT TRANSFER PRODUCTS FOR AUTOMOTIVE AND INDUSTRIAL APPLICATIONS.

HEATING, COOLING, AND AIR CONDITIONING PRODUCTS FOR HOME AND INDUSTRY.

T.M. REG. U.S. PAT. OFF.

YOUNG RADIATOR COMPANY

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Plants at Racine, Wisconsin and Mattoon, Illinois

DISCOVER FOR YOURSELF NEW HEAT TRANSFER ECONOMY

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Rush me the facts about your ☐ Fixed ☐ Removable Tube Bundle Heat Exchangers, without obligation.

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30% FEWER REJECTS...*

because Texaco Cleartex Cutting Oil assures BETTER FINISH

THE job was machining a small pinion gear. The most important operation was drilling a .040" hole, which had to be reamed and held to a plus or minus .0002". Rejects were running high until, on the recommendation of a Texaco Lubrication Engineer, *Texaco Cleartex Cutting Oil* replaced the competitive oil formerly used.

An immediate improvement in finish was noted (as shown by smoother operation of the finished part) and rejects dropped off 30%. Further savings resulted from the fact that *Texaco Cleartex Cutting Oil* serves a dual purpose—being machine lubricant as well as cutting coolant.

Texaco Cleartex Cutting Oil is only one of a complete line of Texaco Cutting, Grinding and Soluble Oils that can help you do all your machining jobs—small or large—better, faster, and at lower cost . . . increase production and reduce unit costs.

A Texaco Lubrication Engineer – a specialist in metal working – will gladly work with you. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

** Name of this Texaco user on request*

TEXACO

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

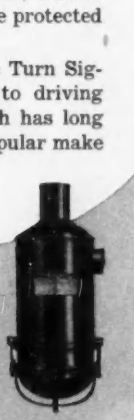
UNITED SPECIALTIES PRODUCTS

Geared to the automotive industry

United Oil Bath Air Cleaners are built for every type of internal combustion engine. Millions of automobile, truck, bus, tractor and farm machinery engines are protected by these efficient cleaners.

The Mitchell Semi-automatic Turn Signal Switch is a positive aid to driving safety. Mitchell Ignition Switch has long been standard equipment on popular make cars and trucks.

In addition Mitchell makes a complete range of rolled shapes, cold rolled, drawn and pressed.



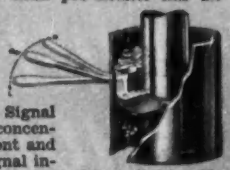
Gasoline engines used on tractors, combines and other agricultural implements are protected by this standard type United Oil Bath Air Cleaner.

Here is a new United Oil Bath Air Cleaner that fills an important need in the after market for vehicles not originally equipped with oil bath air cleaners. Designed with a special fitting, this unit fits practically every car and truck.

This United Oil Bath Air Cleaner is designed especially to protect diesel engines in truck, tractor, grader and industrial power units where wide range of engine speed occurs.

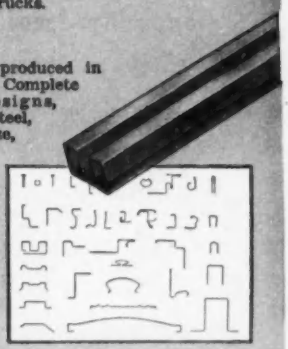
New! Made of tough, durable plastic, this transparent United Oil Bath Air Cleaner affords increased protection against dust for small engines used on garden tractors, power lawn mowers, motor scooters, etc. Cleaning action is visible to user at all times.

Here is another new United development — a chaff pre-cleaner with fitting that is easily attached to your present air cleaner installation. This chaff pre-cleaner is adaptable for all wheel tractors, graders, industrial power units, and agricultural equipment. The chaff pre-cleaner removes a large percentage of chaff, dust and linty materials from the air before it enters the filter unit of the oil bath air cleaner. The chaff pre-cleaner has an outside plastic shell and the dirt pickup is visible at all times to the operator.



Concealed Type Turn Signal Switch. This 6-wire concentric switch utilizes front and rear lights as turn signal indicators as well as parking and stop lights. No additional lights are required — bulbs or sockets only are changed. Signal is self-cancelling.

Conventional type Mitchell ignition switch used on popular makes of cars and trucks.



Metal rolled shapes produced in Philadelphia plant: Complete range of metals, designs, gauges, stainless steel, aluminum, brass, bronze, copper—cold rolled, drawn and pressed for automobiles, airplanes, architectural requirements, railroad cars, radios, television receivers, all industrial uses.

UNITED SPECIALTIES COMPANY

United Air Cleaner Division — Chicago 28 • Mitchell Division — Philadelphia 36

Do You Know

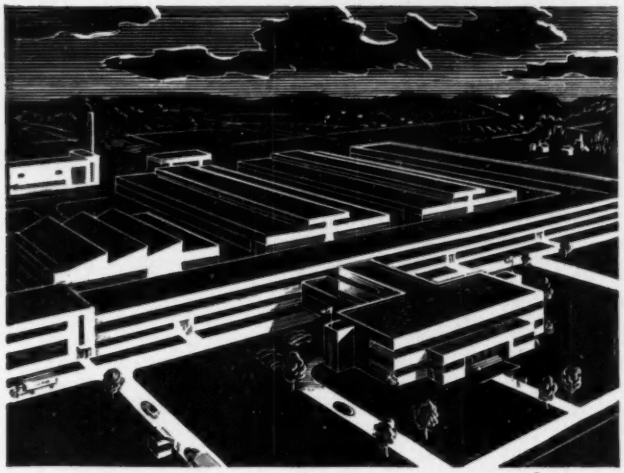
WHAT CAUSES BREAKDOWNS... REJECTIONS IN AUTOMATIC MACHINES?

Fastax High-Speed Motion Picture Studies Have Been Made of:

- Machine Shop Tools Working.
- Failure of Rapidly Moving Mechanisms.
- Faulty Design Problems such as shattering relay contacts and cams.
- Gas and Liquid Flow . . . Combustion.
- High-Speed Weaving and Spinning Operations.
- Mechanical, Electrical, Physical and Anatomical Reflexes and Vibrations.
- Other applications too numerous to mention.

WRITE for catalog and information on how Wollensak can equip a high-speed laboratory for you . . . Completely portable and easy to use. Wollensak Optical Co., 805 Hudson Avenue, Rochester 21, N. Y.

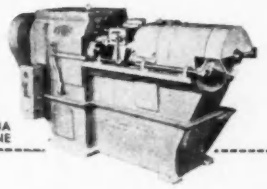
Wollensak MEANS FINE LENSES OPTICAL CO., ROCHESTER 21, N.Y.



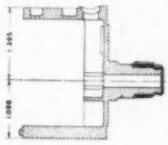
Keenly competitive modern plants have set a single standard for machine tool investments— cost-per-piece— plus sustained machine efficiency.

The reason for insistence on this scientific approach is obvious: the *right* machine pays for itself and begins producing sustained profit in a matter of months, weeks, even days.

New Britain Automatics are designed and built with *sustained low cost-per-piece* as the first consideration.



NEW BRITAIN MODEL 23A AUTOMATIC CHUCKING MACHINE



A New Britain Model 23-A four spindle tool rotating chucking machine turns out the part sketched, which is made from zinc alloy SAE Specification 903. Ten operations are performed, including turning, facing, chamfering, boring, grooving and threading. In turning the outside diameter for threading, concentricity with the previously finished inside diameter is assured by the use of a pilot tool. 742 pieces are completed hourly — one every 4.8 seconds.

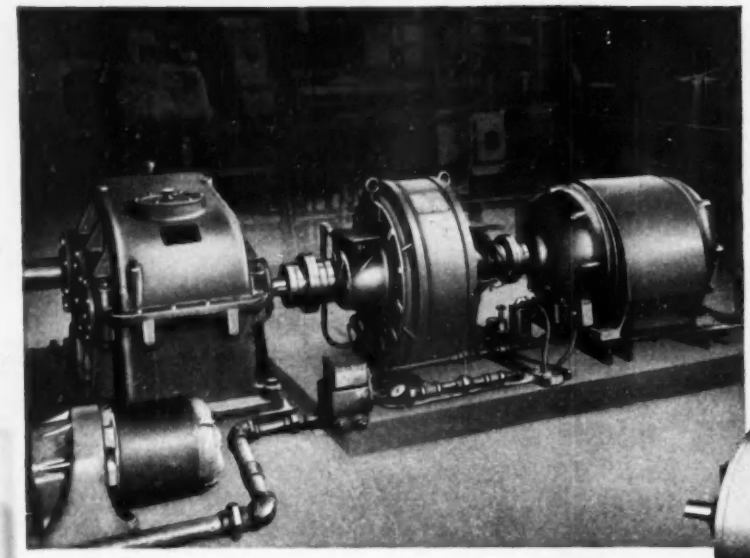
NEW BRITAIN

Automatics

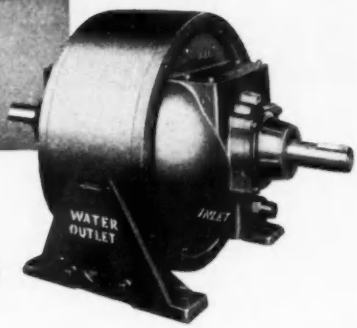
THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

650HF1

MULTIPLE SPINDLE AUTOMATIC SCREW AND CHUCKING MACHINES • SINGLE AND DOUBLE END PRECISION STRAIGHT AND CONTOUR BORING MACHINES • LUCAS PRECISION HORIZONTAL BORING, DRILLING AND MILLING MACHINES



Model 6-W Dynamatic Water-Cooled Coupling driving a calender in a large rubber manufacturing plant. Power is transmitted from AC motor, 100 H.P., 1200 RPM.



ELECTRO-MAGNETIC
DYNAMATIC
EDDY-CURRENT

WATER-COOLED POWER COUPLINGS

Provide Adjustable Speed Drive Direct from AC

The Dynamatic Coupling transmits rotation from a driving to a driven member without mechanical contact—with stepless adjustable control and with almost instantaneous response. It is a simple and effective method of providing adjustable speed from a constant speed source (or vice versa) with full-torque starts. The addition of an eddy-current brake will provide smooth controlled deceleration.

Effective water-in-the-gap cooling makes possible large capacity in small space, and the construction provides complete protection of the interior of the coupling against atmospheric impurities.

A standard range of sizes of Dynamatic Water-Cooled Couplings is available for transmitting torques of 50 pounds feet up to approximately 5,000 pounds feet. Many other sizes up to and including single units for handling 200,000 pounds feet of torque are in service and units of larger capacity can be built to order.

Write for Illustrated Bulletin WC-1.

WIDE SPEED RANGE

INSTANTANEOUS RESPONSE

ACCURATE SPEED CONTROL

STEPLESS SPEED ADJUSTMENT

SMOOTH TORQUE TRANSMISSION

TOTALLY ENCLOSED

SIMPLE • QUIET

COMPACT • EFFICIENT

DYNAMATIC CORPORATION • KENOSHA WISCONSIN

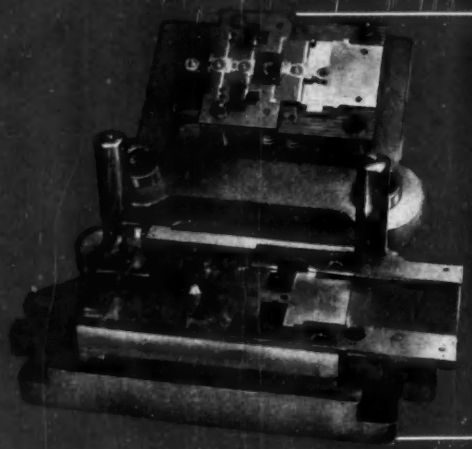
Subsidiary of EATON MANUFACTURING COMPANY, Cleveland, Ohio

Dynamometers • Oil Well Draw-Works Brakes • Adjustable-Speed Couplings • Eddy-Current Brakes
Adjusto-Spedes • Shovel Clutches • Press Drives • Lift Truck Clutches • Electronic Controls

more than 8,000,000 parts

they built the die in a

DANLY PRECISION DIE SET



Danly precision makes every Danly Die Set a reliable base for the finest die work. Time is saved in the die shop because Danly Die Sets are square and true . . . they assure longer production runs in the press because precision closure protects die parts. Standard Danly Die Sets are quickly available from a nationwide system of completely stocked assembly branches.* Just phone for fast delivery, and for the finest in die set precision, always specify Danly.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Ave., Chicago 50, Illinois

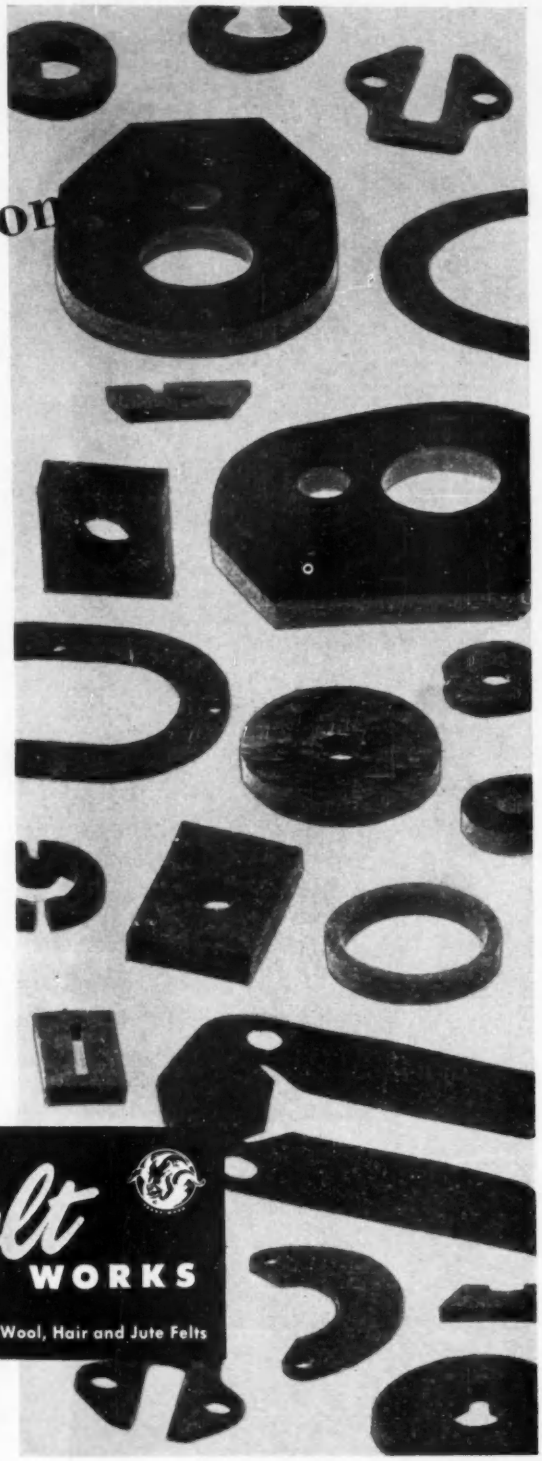
PRECISION DIE SETS . . . STANDARD AND SPECIAL

*WHICH DANLY BRANCH IS CLOSEST TO YOU?

Danly Branch Offices: *Chicago 50, 2100 Laramie Avenue • *Cleveland 44, 1560 East 32nd Street • *Dayton 2, 890 East Monument Avenue • *Detroit 16, 1549 Temple Avenue • *Detroit Suplies, 115 Michigan Street, N.W. • *Long Island City 1, 47-26 37th Street • *Los Angeles 54, Progressive Metals & Supply Co., 6070 South Alameda • Milwaukee 2, 111 East Wisconsin Avenue • Philadelphia 44, 16 West Luzerne Avenue • *Rochester 4, 10 Commercial St. • *Indicates equipped stock

DANLY®

for top precision



Production to close tolerances mostly applies to metal working. But the technique of Western Felt production and processing has built an enviable reputation for engineering precision.

Chemical specifications must be perfectly met – parts from wool softness to rock hardness are cut to close tolerances. As an extremely versatile material Western Felts are resilient, flexible, compressible. They resist oil, water, heat age – do not ravel, fray or lose shape. New uses found daily. It pays to depend on Western Felt.

Check Possible Uses for Your Product

- Excluding dirt, grit, dust • Retaining lubricants
- Thermostatic insulation • Isolating vibration
- Cushioning shock • Padding, packing, seals
- Air and liquid filters • Gaskets, channels, etc.
- Grinding, polishing, etc. • Weight reduction
- Instrument mounts

WESTERN *Felt* **WORKS**

4035-4117 Ogden Ave., Chicago 23, Illinois

Branch Offices in Principal Cities

Largest Independent Manufacturers and Cutters of Wool, Hair and Jute Felts

Acadia Synthetic Products Division, WESTERN FELT WORKS, Processors of Synthetic Rubbers — Sheets, Extrusions, Molded Parts.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK

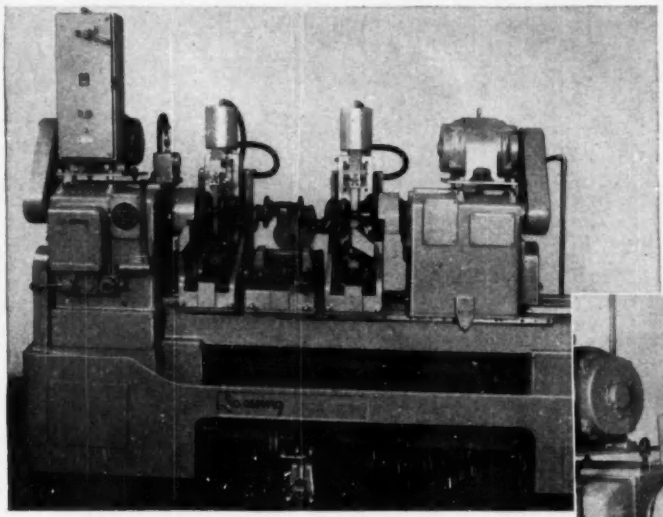
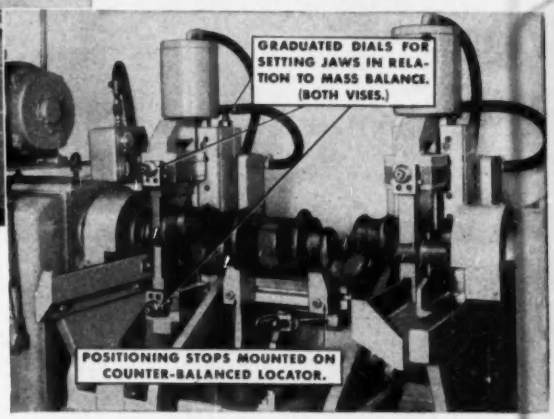


FIGURE 1. Vises are positioned vertically to facilitate loading and unloading heavy crankshafts.

FIGURE 2. Counter-balanced positioning locator stops raised against cheeks to position crankshaft for accurate depth of centers.


GRADUATED DIALS FOR SETTING JAWS IN RELATION TO MASS BALANCE. (BOTH VISES.)
POSITIONING STOPS MOUNTED ON COUNTER-BALANCED LOCATOR.

IMPROVED LOADING METHOD SPEEDS UP *Lo-swing* CENTERING OPERATION ON HEAVY CRANKSHAFTS

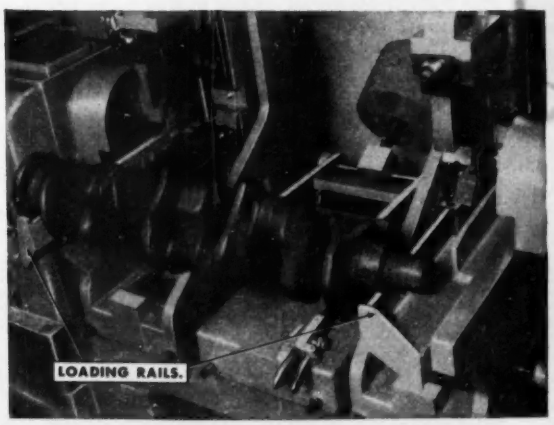
Problem: To reduce operator fatigue in centering both ends of heavy crankshafts in relation to center of mass balance.

Solution: The Model "CS" Lo-swing Automatic Centering Machine selected for this job was equipped with vertically-designed air-operated vises, fitted with built-in loading rails. (Fig. 1).

In operation, the first crankshaft forging of the lot is centered with all jaw adjustment dials set at zero. The crankshaft is then centered and tested for mass balance in a balancing machine, after which fine adjustments are made on the vise jaws. The machine is now ready for a production run of a particular type of crankshaft. Depth of the two centers in relation to the cheeks is accurately maintained by the counter-balanced positioning locator stops shown in Fig. 2. With these vertically-positioned vises, the operator merely sets the crankshaft on the loading rails and pushes it forward until it drops into position in the open vise jaw. (Fig. 3)

Lo-swing engineers are at your disposal to assist with your handling and machining problems.

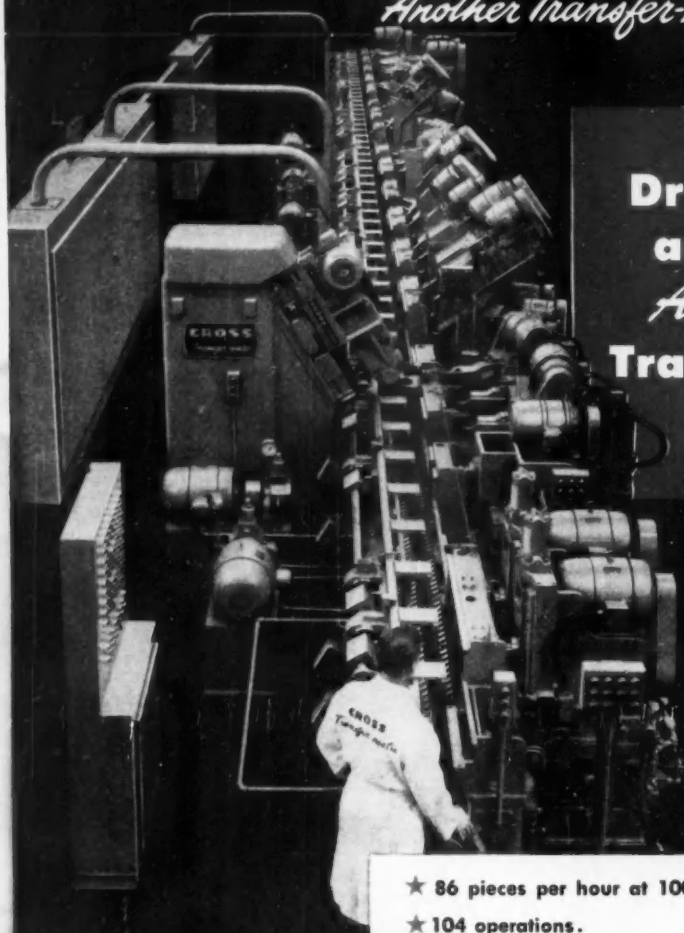
FIGURE 3. Vise jaws open to level of loading rails... no lifting required to remove crankshaft from vise jaws.



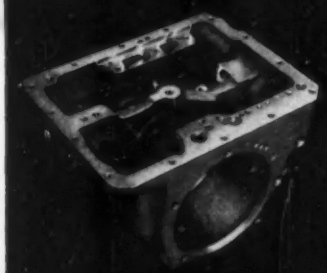
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

Another Transfer-matic by Cross



Drills, Mills and Taps *Automatic* Transmission Cases



★ 86 pieces per hour at 100% efficiency.

★ 104 operations.

★ 54 stations—1 loading; 6 milling; 23 drilling, reaming, and counterboring; 2 tapping; 21 inspection; 1 unloading.

★ Cross Machine Control Unit with "Toolometer" automatically stops machine when any tool requires changing; pre-set tools reduce down time.

★ Other features—hardened and ground ways, hydraulic feeds, automatic chip conveyors, standard unit construction.

Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

Over a Million

Hydro-Lectric window operating systems prove their dependability

Hydro-Lectric is the only push-button window control tested by time

Automotive engineers know that no matter how thoroughly they test a new mechanism in the laboratory or on the road, it cannot be perfected until thousands of motorists have used it under all kinds of operating conditions.

In the field of automatic window regulators, only the Hydro-Lectric system has met this challenge. It has been tried and proved in production cars since 1940. As a result, many improvements have been incorporated. Today, the Hydro-Lectric system is recognized by most automotive engineers as a proven, trouble-free and dependable system of window operation.

DETROIT HARVESTER COMPANY

EXECUTIVE OFFICES: 2550 GUARDIAN BUILDING, DETROIT, MICHIGAN

PLANTS: · DETROIT · YPSILANTI · TOLEDO · ZANESVILLE

Convertible Tops | Contract Production Parts | Power Mowers | Side Delivery Rakes | Power Sweepers | Window Channels and Regulator Assemblies | Automotive Hardware | Power Take-Offs | Hydro-Lectric Top, Window and Seat Controls

Bendix Products

CREATIVE ENGINEERING

GEARED TO QUANTITY PRODUCTION

HYDROVAC

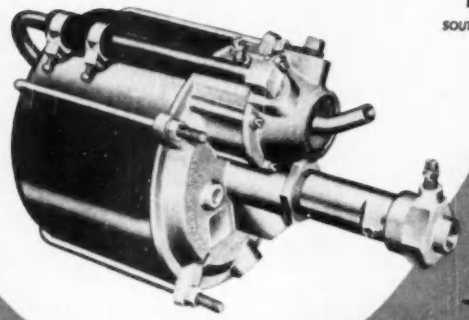
THE POWER BRAKE PREFERRED ABOVE ALL OTHERS!

More than two million installations are certainly undeniable proof of any product's popularity. In the field of power braking it means that one —the Bendix Hydrovac—is preferred above *all* others. Such overwhelming acceptance by the men who service, drive and own the nation's trucks is impressive enough in itself. It further suggests, however, that Hydrovac* power braking might very profitably be included as original equipment by most manufacturers. If you are interested in taking advantage of this great pre-sold market, write the factory direct for details on Hydrovac—the undisputed leader in power braking.

*REG. U.S. PAT. OFF.

BENDIX PRODUCTS
DIVISION of
SOUTH BEND 20, INDIANA

Export Sales: Bendix International Division,
72 Fifth Avenue, New York 11, N. Y.



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OF THE BASICS
OF BETTER
MOTOR VEHICLES

AUTOMOTIVE INDUSTRIES

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AUTOMOTIVE INDUSTRIES
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High Spots of This Issue

★ Inspection Costs Reduced

The author tells how Ford Motor Co. has maintained operating economy, engineering standards, and the reduction of scrap and rework by utilizing statistical quality control in conjunction with various automatic inspection devices. See page 32.

★ British Truck and Bus Show

New engines and chassis, many for the export market, are illustrated and described in this interesting article. It is noted that the trend in British bus design is to the underfloor engine. Page 34.

★ Studebaker's Engine and '51 Features

An overhead valve 120-hp V-8 engine is being offered in the Commander and Land Cruiser models for 1951. Design data and specifications of the new engine are given in the article beginning on page 38. For features of the 1951 model cars, including new center point steering, see page 44.

★ Car Design

Weight and air resistance of passenger cars are analyzed in order to show the effect these factors have on performance and economy. Weight reduction and improved streamlining are advocated in this article beginning on page 42.

★ Eight Miles of Conveyors

Selected highlights of De Soto's mechanized and modernized Warren Ave. body plant are presented in this article. Besides the many miles of conveyors that are controlled by electronics, the plant features a fully automatized body painting operation. Page 46.

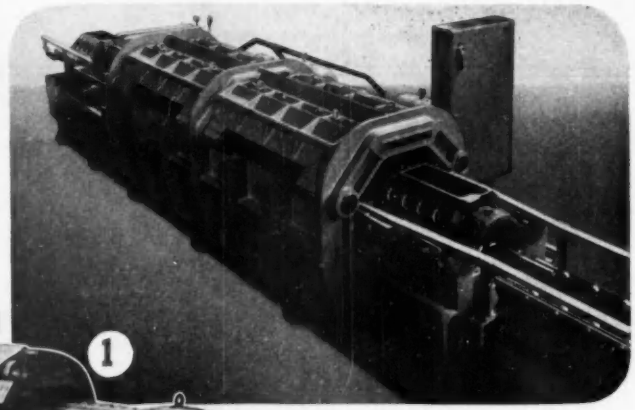
★ Many New Product Items and Other High Spots Such As:

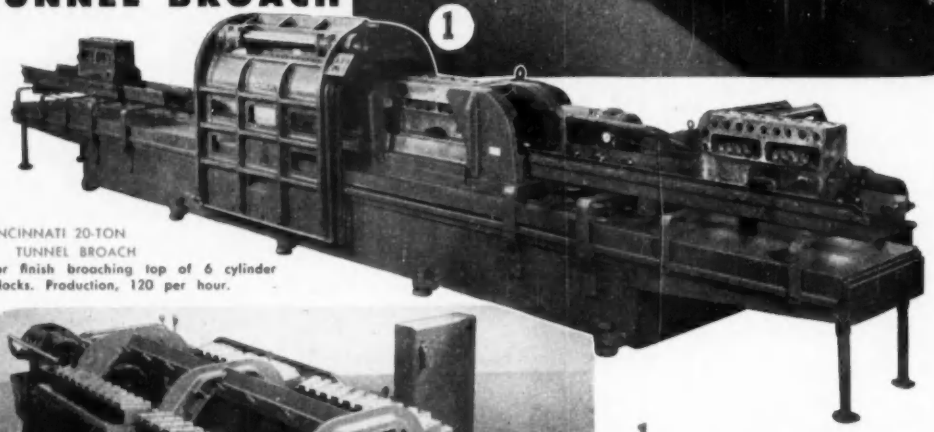
Mercury for 1951 that features the Merc-O-Matic transmission; fuel evaluation for high compression engines; making cars free of objectionable noise; and the 49th annual meeting of the National Machine Tool Builders' Association.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

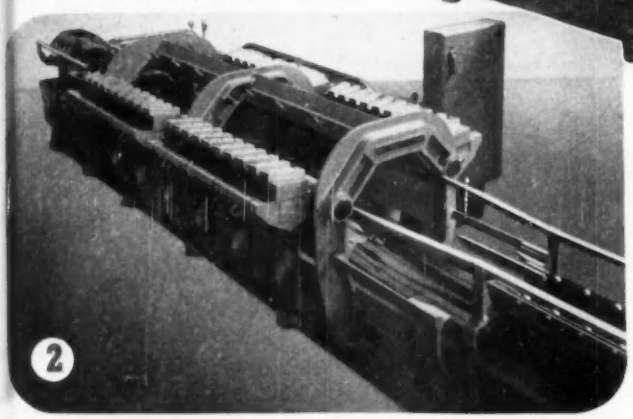
UP TO 140 QUICK SHAVES PER HOUR

FOR CYLINDER HEAD FACES WITH CINCINNATI TUNNEL BROACH





CINCINNATI 20-TON TUNNEL BROACH for finish broaching top of 6 cylinder blocks. Production, 120 per hour.



1 CINCINNATI 10-ton Tunnel Broach. It broaches two faces of V-8 cylinder blocks, at the rate of 71 blocks per hour, removing .032" max. stock each face.

2 Broach holders are hinged to facilitate removal of inserts when necessary to sharpen them.

A light skim cut on the faces of cylinder blocks, just before assembly, does wonders in conditioning them for other parts which have been so meticulously prepared. CINCINNATI Tunnel Broaches handle operations of this type at the lowest unit cost. ¶ Basically a simple, efficient machine, Tunnel Broaches are integrated with waist-high conveyors on the entrance and exit ends. The ram is hydraulically actuated. It carries the fixture which holds the work, pushing it under the bank of broach inserts (cutters). A wire cable pulls the finished part onto the exit conveyor as the fixture returns to the loading position, thus making use of the idle time. ¶ This is but one of the many examples of Cincinnati ingenuity in low cost broaching. Perhaps our application Engineers can point out better, lower cost surface finishing methods for your shop. It costs nothing to inquire. Write to Department E. S.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

REPLACE WITH A NEW CINCINNATI

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

News of the AUTOMOTIVE INDUSTRIES

Vol. 103, No. 9 November 1, 1950

1950 Vehicle Production to Approach 8 Million

Steel and other materials are very tight but the automobile industry is still very optimistic about production for the rest of this year. GM divisions have actually added on to their schedules for the 1950 model run beyond what was originally expected. The independents all have completed model changeovers and are roaring back into production at the highest rate possible consistent with steel available. There will be model changeover periods for Ford, most GM divisions, and possibly Chrysler yet this year, but these will be of short duration. Despite all the uncertainty of materials supply, talk of arbitrary cutbacks, a possible sales slump because of credit controls, and other difficulties, the production of nearly eight million cars this year is still predicted by some industry spokesmen. However, everything will have to work in favor of the industry if that phenomenal total is to be reached.

By the middle of October, total U. S. output of cars and trucks stood at 6,340,000 units, leaving more than 1.6 million to be built in the last 11 weeks of the year. Production would have to average more than 150,000 cars and trucks a week to reach the eight million total. While that is possible, it does not seem likely in view of model changeovers, holiday disruptions and other potential difficulties. However, output should be well over 7.5 million. When Canadian production is added, of course, the total should reach eight million units this year.

K-F Completes First Half-Million Cars

Kaiser-Frazer completed its first half million cars Oct. 10, just a little more than three years after production of the first unit. At the same time the company completed the 100,000th car to be built this year. Production at present is at an all-time high of 1200 cars a day.

Studebaker Raises Price on Champion Model

Studebaker has increased prices of its 1951 Champion models by $50. At the same time the company cut the price of its Commander series models as much as $110. Retooling for 1951 models, plus improvements in manufacturing facilities cost Studebaker about $20 million.

North American Signs 3-Year Contract With UAW

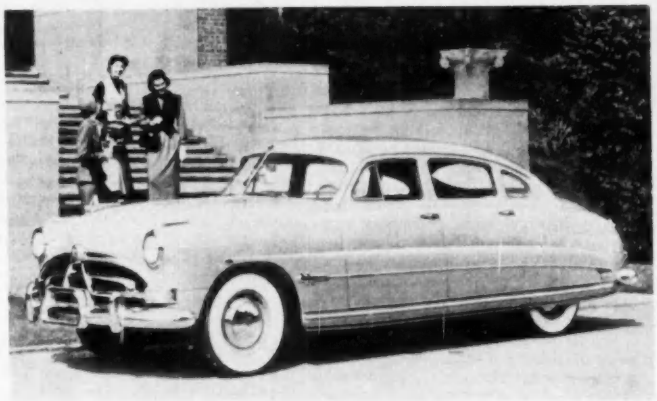
A three-year agreement granting a general pay increase of nine cents an hour, plus five cents an hour for certain skilled jobs, and basing wages for the next three years on a cost of living formula was reached by North American Aviation, Inc., and the UAW-CIO. It is the first long term labor contract in the aircraft industry.

Wright and Armstrong Siddeley Sign Seven-Year Agreement

Calling for the exchange of current and future products, a seven-year agreement has been announced by the Wright Aeronautical Corp., subsidiary of Curtiss-Wright Corp., and Armstrong Siddeley Motors, Ltd., England. This will make available to the U.S. Air Force the newly-announced Armstrong Siddeley Sapphire jet engine, as well as the Mamba, Double Mamba, and Python turbo-propeller engines.

Ford Raises Price of Farm Tractor

Dearborn Motors Corp. has announced an increase of $89 in the price of the Ford tractor which is produced by Ford Motor Co. and distributed by Dearborn Motors. The price boost is the first on any product by any one of the Big Three. The increase was charged to higher costs of wages, pensions and insurance payments.



HUDSON FOR 1951

Led by an entirely new series, the Hudson Hornet, the Hudson Motor Car Co. has four 1951 lines. The Hornet (see page 56, Oct. 15th Automotive Industries) is powered by the new H-145 six-cyl engine, and has a wheelbase of 124 in. In addition, Hudson has the Commodore Custom, Super-Six Custom, and the Pacemaker Custom series.

Buick to Surpass Goal of Half Million Units

Since the end of the war, Buick has been aiming at a goal of 500,000 cars during one calendar year. It is now certain that the half million mark will be reached this year, and if present plans materialize, that goal will be exceeded by an additional 50,000. Even with that remarkable production record, Buick will not take third place this year. Despite the setback of a 100-day strike early this year, Plymouth has roared back into third position and now leads Buick by several thousand units.

New Credit Curb Shocks Automobile Industry

First automobile industry reaction to the drastic tightening of Regulation W, shortening time payment balances on automobiles from 21 to 15 months, was shocked surprise. While dealers were immediately vocal in their predictions of dire effects from the Regulation, manufacturers were more restrained and inclined to a "wait-and-see" policy. Unofficially, however, they concede that the new type credit rule is bound to affect sales adversely. Even with the 21 months limitation imposed in late September, sales had begun to fall off. However, no one is quite sure whether it was due to the credit regulation or to normal seasonal decline plus a drop from the panic buying during July and August. Under the new rule, monthly payments for even the lowest-priced standard models of the Big Three will run about $90 a month. Credit men say that is too high for a large segment of the buying public. Consensus is that there will be no immediate effect upon automobile production even though sales are slowed by the credit ban, since dealer inventories have been very low and it would take some time to get them built up to a desirable level in most cases. At the same time it is expected that aggressive selling will now be necessary.

Higher-priced lines are expected to be particularly hardest hit by the stringent controls with considerable filtering down of buyers from higher-priced lines into the medium-priced field and from the medium group down into the lower of the Big Three. There is some belief that if the new regulation has as drastic an effect on sales as dealer organizations have predicted, they may be relaxed somewhat. The industry has been more or less expecting a cut from 21 months to 18 and it is possible that the ban may be relaxed back to the 18 months.

Acme

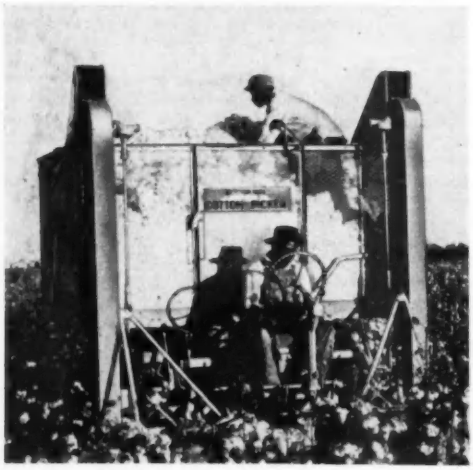
ROAD RUNT

This two - passenger Rolux automobile weighing 300 lb, was one of the smallest cars shown at the recently-held Paris automobile exposition. It has a maximum speed of 50 mph.

Willys Gets Large Army Order

Willys-Overland has received another order from Army Ordnance, the largest single order since October, 1944. Number and dollar value of the order were not revealed because of security regulations. The new order is the second since July 5 when Willy received a commitment for more than $22 million worth of military Jeeps. The company also has received an order for an unspecified amount of civilian model Jeeps from ECA. Total unfilled orders now amount to more than $121 million. Chevrolet has received an order valued at more than $7.4 million for 619 half-ton pickup trucks from Army Ordnance. Fargo Motor Corp., Chrysler subsidiary, will furnish Ordnance 1019 five-passenger Plymouth sedans. Value of the order is more than $1.3 million. Ford Motor Co. has received a contract to supply Army Ordnance with 964 six-cyl five-passenger sedans to be delivered before next Jan. 2. The cars will be used for administrative purposes by the military services. The contract totals more than $1.3 million.

The U. S. Dept. of Commerce has also announced the award of the following Dept. of Defense contracts: Ford Motor Co., aircraft engines and spare parts, $35 million; Wright Aeronautical Corp., Curtiss-Wright Corp., spare parts for aircraft engines, $3.2 million, and GM's Allison Div., $4.3 million; North American Aviation, aircraft assemblies and parts, $3.5 million.



TWO-ROW PICKER

The new Allis-Chalmers two-row cotton picker, shown here, powered by a four-cyl, 201-cu in. Allis-Chalmers engine, has an overall length of 17 ft, 19½ in.; height of 11¼ ft; and width (basket extension raised) of 9 ft. 1⅜ in.

K-F Appoints Monahan to Top Labor Post

Kaiser-Frazer has announced appointment of William W. Monahan as vice president in charge of industrial relations. He succeeds Robert A. Graney who has resigned to open his own industrial relations consulting agency on the West Coast. He will be retained by K-F in that capacity.

INDUSTRIES

GM's McKinnon Industries Plans Expansion

Construction of a malleable iron foundry and power plant will be undertaken by McKinnon Industries of St. Catharines, Canada, a subsidiary of General Motors Corp., as a preliminary step to expanding automobile production and reinstating the manufacture of the Buick in Canada early in 1951. The McKinnon expansion program is expected to cost $10 million. This includes tooling and equipment for production of GM Buick models.

Nash to Supply Engines for English Sport Car

Nash has entered into an agreement with Healey Motor Co. of Warwick, England, to supply engines and transmissions for a sports car to be known as the Nash-Healey. The Nash deal is an export proposition at present, and calls for supplying the Ambassador engine and transmission. The pilot model of the new car, which is a high-priced sports automobile, took fourth place in a French endurance test last July despite a rear end collision which forced the car to make the cross country run locked in high gear.

Tank Automotive Center Set Up in Detroit

In order to expedite procurement of automotive vehicles and motorized weapons, procurement facilities of the Army Ordnance Corps at Detroit have been reorganized and expanded. An Ordnance Tank — Automotive center has been established to take over procurement of military vehicles of all types, thus relieving the Detroit Arsenal of that responsibility. The center will be national in scope and will be attached to the office of the Chief of Ordnance. Unlike its World War II predecessor, the new center has authority to let contracts and does not have to deal through district ordnance offices.

Chevrolet Powerglide Output Past 200,000

Chevrolet, early in October, completed the first 200,000 Powerglide automatic transmissions at its Chevrolet plant and production is steadily rising. The division started building the automatic drive Jan. 4 of this year and completed the first 100,000 in about six months. The second 100,000 units were built in about 3½ months and when current expansion of facilities is completed output will be greatly accelerated.

Firms Seek Lustron Plant for Military Work

More than 40 companies are seeking to obtain the large plant at Columbus, O., which formerly housed the defunct Lustron Corp. Bidders are endeavoring to get the plant for defense work. Major companies who have submitted proposals for the plant are General Electric, Westinghouse and Avco Mfg. Corp. Bids are submitted to RFC which has control of the plant, which in turn deals with the Munitions Board. An early decision is expected.

Fisher Using Television in Plant Operation

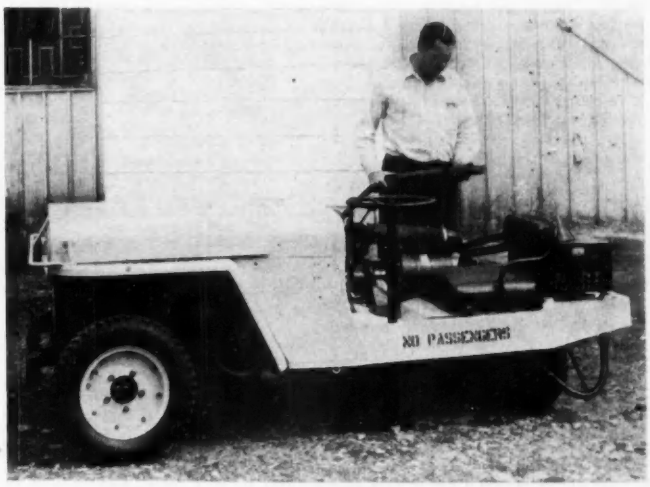
A unique feature of the new Fisher Body Pittsburgh plant is use of television for communication between two widely separated operations in the scrap baling department. The camera is focused on the discharge end of the scrap conveyor where it empties into the gondola scrap car. The image is conducted over 900 ft of coaxial cable to the scrap baler inside the plant. The operator thus has a view of the scrap car located on the railroad track outside the building at all times. Through a car puller device operated from the baler control station, the operator moves the car along to insure uniform loading. The scrap removal system at the plant is also unique, consisting of an underground conveyor system fed by chutes leading directly from the 13 lines of presses. The new system eliminates the confusion of scrap gondolas wheeling in and out of production lines. The underground conveyors run directly to the baler.

Steel Shortage Cuts Nash Production

The steel shortage has already curtailed production of cars at the Nash-Kelvinator Corp. As early as the first week in October, Nash had reduced its production by about 10 per cent because of the critical steel supply. The company also cut output of its refrigerators and electric ranges by 10 per cent on Oct. 11.

Car Makers Support Detroit Exposition

Although automobile manufacturers have abandoned plans for an automobile show in Detroit next year in con-



JEEP FOR JETS

Used to energize jet aircraft and conventional military airplanes this converted Willys-Overland Jeep is a compact mobile power plant particularly adaptable to aircraft carrier duty. Fred Stewart, assembly superintendent, O. E. Szekely and Associates, Philadelphia firm that produces the tricycle-geared Jeep, inspects the 15-ft cable used to service planes with starting power

IDENTIFIES AND MEASURES

This Dodge Route-Van delivery truck is equipped with all of the instruments needed to identify and measure radioactivity. Built by Radiation Counter Laboratories, Inc., Chicago, the lab is installed in the 12½-ft body of the truck which has 462 cu ft of space for tools and equipment.

nection with the city's 250th anniversary, they are making a substantial financial contribution to the event. Both Ford and GM have made sizable contributions to bring the fund being raised to the half-way point.

Now Known as Warner Electric Brake & Clutch Co.

The Warner Electric Brake Mfg. Co., Beloit, Wisc., will hereafter be known as the Warner Electric Brake & Clutch Co., to more closely associate its name with the firm's full scope of operations. The change was made, it was stated, to give recognition to Warner's expanding line of electrically-powered brake and clutch devices, extending far beyond the original trailer brakes.

Trico Products Plans Expansion

The Trico Products Corp. has revealed that plans have been completed for a new addition to its Buffalo plant. The new addition, to cost between $750,000 and $1 million, will provide Trico with additional floor space of about 70,000 sq ft.

Detroit Junior SAE Sets Up $200 Award

The Junior Section of SAE at Detroit has established a new award for encouragement of younger automotive engineers. Called the "Henry Ford Memorial Award" in honor of the late automotive pioneer, the competition is open to any member of the SAE under 33 years of age regardless of membership grade. The winner receives a suitable certificate of merit plus $200 in cash. The award is given for an original paper presented, or suitable for presenting, at an SAE meeting. Content is limited to automotive ground vehicles and must describe an engineering work or record an engineering investigation. The award committee will consider all eligible papers presented before an SAE meeting or submitted to the committee during the SAE Detroit Section year from June 1 to May 31. The award committee members are Kenneth R. Herman, vice president of Vickers, Inc.; Robert Insley, vice president of Continental Motors; and Harold L. Brock, truck engineer for Ford Motor Co. A brochure covering eligibility rules and other information about the award is available from SAE headquarters in Detroit.

STERLING GIANT

The Sterling Motors Corp., Milwaukee, Wis., has announced this new off-highway dump truck, model SF7506D. Built to haul payloads up to 45 tons, this chassis has a GVW rating of 160,000 lb. It is powered by an eight-cyl supercharged Diesel engine with a piston displacement of 1125 cu in., developing 325 hp and 990 lb-ft of torque.

MEMA Elects New Directors

The Motor and Equipment Manufacturers Association has elected the following directors for the 1951-1952-1953 term: W. J. Greene, the L. S. Starrett Co., Athol, Mass.; D. L. Millikin, Rust Master Chemical Co., Boston, Mass.; R. L. Smith, Pyrene Manufacturing Co., Newark, N. J.; and F. G. Wacker, Jr., Ammco Tools, Inc., North Chicago, Ill.

The MEMA board of directors for 1951 follows: G. W. Andrews, Andrews Manufacturing Co., St. Louis, Mo.; W. S. Coles, the Shaler Co., Waupun, Wisc.; W. J. Greene, the L. S. Starrett Co., Athol, Mass.; D. L. Millikin, Rust Master Chemical Co., Boston, Mass.; S. G. Phillips, the Dole Valve Co., Chicago, Ill.; G. W. Sherin, E. I. du Pont de Nemours & Co., Wilmington, Del.; R. L. Smith, Pyrene Manufacturing Co., Newark, N. J.; R. A. Stranahan, Jr., Champion Spark Plug Co., Toledo, O.; F. G. Wacker, Jr., Ammco Tools, Inc., North Chicago, Ill.; J. M. Wells, Ingersoll-Rand Co., New York, N. Y.; G. O. Wherley, the Timken Roller Bearing Co., Canton, O.; and E. J. Wilcox, J. H. Williams & Co., Buffalo, N. Y.

GM Film for High Schools Teaches Safe Driving

GM has stepped into the traffic safety program with a new comprehensive and

correlated series of motion pictures and slide films on driver education for use in high schools. The films, designed by GM and the National Education Association are aimed specifically at the high school student and are the first of their kind to be produced. Leading automotive and traffic authorities also furnished technical guidance. The series includes three motion and 12 slide films covering all important points involved in safe automobile operation. GM has underwritten all production costs, thus making the complete series available at a price of $69.75. GM has also donated a complete set of the films to each State Educational Department.

FWD Given Large Order for Trucks by Egypt

The Egyptian government has placed an order for 619 standard trucks with Four-Wheel-Drive Auto Co., Clintonville, Wisc. Representatives of the company and the Egyptian government have been working for two years on the order, arranging details of the long term sales contract, conducting tests, and solving problems of dollar-pound sterling exchange. The trucks will be built over the next six months and will not interfere with regular commercial production. They will be shipped knocked down for assembly in Egypt.

Ford Promotes Smead to Sales Manager

L. W. Smead has been named general sales manager of the Ford Div. of Ford Motor Co. Previously assistant general sales manager, he succeeds Walker A. Williams who was recently made vice president—sales and advertising.

U. S. Spring & Bumper Acquires Fether Co.

The United States Spring & Bumper Co., Los Angeles, has acquired Fether & Co., Santa Clara, Calif., which will now be known as the Brake Div., United States Spring & Bumper Co. The newly purchased unit manufactures brake linings for the automotive and commercial field.

Fisher Guild Scholarships Total $340,000

The Fisher Body Craftsmans Guild competition is really big business. To date the Guild has awarded 99 university scholarships worth $340,500, plus cash and other awards of $488,435. More than 9500 talented boys between 12 and 20 have received state and regional awards for their skill in designing and building model automobiles. The Guild has just announced that the 1951 competition is underway with cash awards and university scholarships totaling $65,000.

Packard Considers Cut In Number of Shares

Talk about a reduction in the number of outstanding shares of Packard stock is again back in the news, this time with some official backing. Hugh J. Ferry, Packard president, stated recently that the company has been considering the problem of reducing the number of outstanding shares from 15 million to 3 million. It is understood that the matter will be discussed at the annual meeting of stockholders next spring. Mr. Ferry also said that no dividend to stockholders is planned for this year although the company currently is in excellent financial condition.

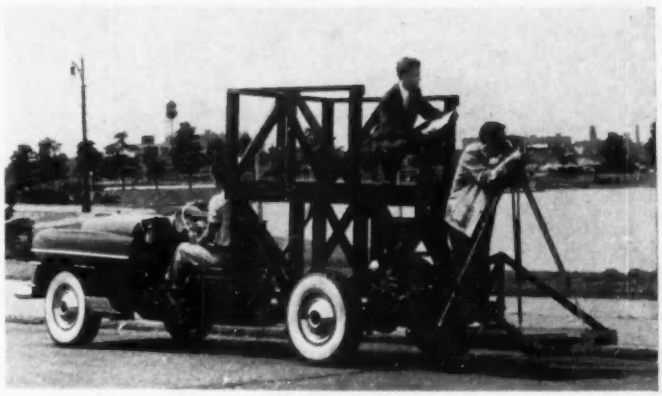
Cummins Engine Expands Plant

Described as the largest single expansion at one time in its 30-year history, construction of a new building, 200 ft wide and 460 ft long, by Cummins Engine Co., Inc., of Columbus, Ind., will begin immediately, adding 92,000 sq ft of floor space. The new structure, known as the Stores Center building, will become a central storage for all materials and supplies. It will also house quality control and inspection activities, and an enlarged department for shipping service parts.

Champion Spark Plug Files Brief with FTC

If the Federal Trade Commission approves an order proposed by one of its trial examiners to outlaw discount practices as old as industry, independent businesses, manufacturers, wholesalers and retailers, will be forced to go out of business or merge with larger units, the Champion Spark Plug Co. contended in a brief filed with the FTC vigorously opposing any change in the basic system of discounts under which all business has flourished. The proposed FTC order would ban all functional discounts except those based on actual cost differences. Champion cites the ruinous effects of such a policy in promoting monopolies and terms its action a "test case for all industries." The FTC action involves separate complaints against Champion, the Electric Auto-Lite Co., and GM's AC Spark Plug Div. There is no allegation of price-fixing or any collusive activity.

Declaring that this "ill-conceived and irresponsible attack upon the American functional price structure is contrary to all authority," Champion contends the proposed order before the FTC, if approved and applied throughout industry, would bring the following results: substantial increases in prices for new automobiles and a general boost in prices of virtually all manufactured



TV ON WHEELS

This improvised camera car, built on a standard Chrysler New Yorker chassis, has a wooden superstructure which provides two shooting platforms for varied-angle photography. The lower platform folds into structure for over-the-road transport.

HIGH SPEED BOMBING

Heavy bombs are shown here being safely and accurately dropped reportedly for the first time at speeds over 500 mph in test runs with a U. S. Air Force North American Aviation B-45 Tornado four-jet bomber at Edwards Air Force Base, Muroc, Calif.

products; death blows to many thousand independent firms who now sell to manufacturers due to large, integrated companies making their own parts and supplies; end of a discount system under which independent manufacturers, wholesalers and retailers have thrived; state and local governments would no longer enjoy preferential discounts and would face higher costs for purchases; new precedents in Federal bureaucracy interpreting a law without considering evidence of the effect of such interpretation on the overall economy.

Control of Ford Motor Co. Retained by Family

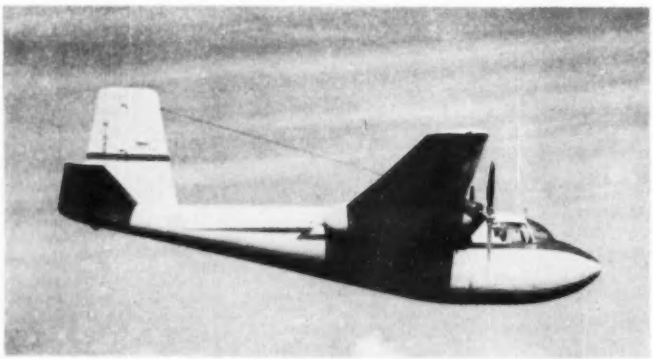
Control of the Ford Motor Co. will not be affected by the death of Mrs. Henry Ford on Sept. 29. Before her death she had disposed of all her voting stock to members of the Ford family. Her estate, consisting largely of Ford non-voting stock, was bequeathed to Edison Institute and to her grandchildren and great grandchildren. The will provides $4 million for the Institute, 3000 shares of Ford stock to her two youngest grandchildren, Mrs. Josephine Ford Ford, and William Clay Ford, with the remainder of the stock to be divided between her nine great grandchildren.

Clark Named Manager of Chevrolet-Flint

Major W. Clark has been promoted to manager of the Chevrolet-Flint plant. He succeeds J. A. Foley who resigned to become a Chevrolet dealer in Vancouver, Wash.

AMA Publication Shows How Cars are Built

During the course of a year the Automobile Manufacturers Association publishes several publications designed to promote a better understanding of the automobile industry. Its latest is an excellent 48-page booklet called *What It Takes To Make Your Car.* It portrays pictorially the thousands of steps necessary to produce the modern automobile from the first concept of planning, through the raw materials, processing operations, and assembly to produce the finished vehicle.



PRIMARILY UTILITY

Intended primarily as a utility aircraft for the military and as an executive transport and feederline airplane, the Aero Commander Model L-3805 was designed and produced by the Aero Design and Engineering Corp., Culver City, Calif. A twin engine all-metal, high wing monoplane, its gross weight is 4200 to 4600 lb. The display model was equipped with two Lycoming 190-hp O-435-A engines, but utilization of the Lycoming GO-435-C2 engine with 260 hp or the Continental E-225 engine with 225 hp is also contemplated. Installation of turbo-jet or turbo-prop engines in the Aero Commander is also planned

Stratos to be Division of Fairchild

The Stratos Corp., wholly-owned subsidiary of the Fairchild Engine and Airplane Corp., will become a division of Fairchild. Stratos manufactures aircraft cabin superchargers, aircraft cooling units, and associated equipment.

Black Still Favorite With Buick Buyers

Black is still the most popular color, at least so far as Buick buyers are concerned. A. H. Belfie, general sales manager, says that popularity of pastel shades is increasing, but black still leads its nearest competitor, olympic blue, by nearly two to one. Sale of black cars amounts to 19.1 per cent of total output, compared to 10.9 with the second place blue. An interesting exception are Western buyers who generally favor the pastel shades with black as fourth choice.

INDUSTRIES

Commerce Puts Controls on Metals Exports

Anticipating increased shortages in various raw materials, the Commerce Dept. has imposed destination controls on the export of several nonferrous metals and their manufactures. Until further notice, licenses will be required for the export of the following to all countries except Canada: aluminum (ingots and other crude forms, scrap, bars and rods, wire, perforated sheets, and mill shapes); copper and its manufactures; brass and bronze manufactures (including diestocks, shims, bearings and bushings); zinc and manufactures (sheets, plates, strip, alloys, die castings, scrap and dust, and other forms); and lead and its manufactures. Quantitative quotas have also been imposed upon most of these items for export during the fourth quarter 1950.

Synchro-Start Building New Plant

Synchro-Start Products, Inc., Chicago, has broken ground for the first unit of a new factory to be located northwest of Chicago in the village of Skokie. This unit will house the main offices and final assembly, with the fabricating remaining in other plants as before until additional space can be built. The company manufactures automatic engine control equipment, demand for which necessitates the expansion.

Aro Equipment Gets Taylor Machine

The Aro Equipment Corp. has acquired the business and assets of the Taylor Machine Co., Cleveland, O. Aro aircraft accessories, formerly manufactured at the main plant in Bryan, O., will be produced at the new plant to be known as the Aro Equipment Corp. Aircraft Div.

Packaging & Mat'ls Handling Show in Philadelphia

The Fifth Annual Industrial Packaging and Materials Handling Exposition, held in Philadelphia Oct. 11-12, included a review with teams of specialists from the General Electric Co., for a presentation of the "General Electric Approach to the Solution of Materials Handling Problems," under the chairmanship of Paul O. Vogt, CE's Manufacturing Policy Div. Other presentations included "Organizing and Planning for Packaging and Material Handling Activities," Robert G. Anderson, Sperry Gyroscope Co.; "Technological Age of Methods Not Building's Age Determines a Plant's Modernity," Leo J. Pantas, works manager, Salem Div., Yale & Towne Mfg. Co.; "Pallet Program for Older Buildings," Henry T. French, supervisor, packing design, Electric Storage Battery Co.; and "Application of Modern Mechanized Handling Principles to the Transportation Field," A. V. Blatz, A. O. Smith Corp.

Winners in the concurrently-held 1950 National Protective Packaging and Materials Handling Competition were as follows:

GROUP 1—**Corrugated or Solid Fibre Boxes.**
FIRST PRIZE—Charles L. Foy, GM's Detroit Diesel Engine Div.
(Cylinder Kit)
SECOND PRIZE—K. W. Montgomery, Douglas Aircraft Co., Inc.
(Airplane High Density Passenger Seats)
HONORABLE MENTION — Louis A. Holder, the Timken Roller Bearing Co.
(Timken Tapered Roller Bearing)
HONORABLE MENTION — Wilburn Couch, GM's GMC Truck & Coach Div.
(Bevel Gear & Pinion)

GROUP 2—**Nailed Wood Boxes and Crates.**
SECOND PRIZE—Victor C. Krosel, GM's Electro Motive Div.
(Commutator)
THIRD PRIZE—H. H. Kelly, Westinghouse Electric Corp.
(Circuit Breaker Bushings)
HONORABLE MENTION — Wm. M. Ward, GM's Pontiac Motor Div.
(Eight-cyl. Partial Engine)

GROUP 3—**Wirebound Boxes and Crates.**
HONORABLE MENTION—John F. McAloon, Studebaker Corp.
(Overdrive Transmissions)
HONORABLE MENTION — Melvin C. Koester, Libbey - Owens - Ford Glass Co.
(Automotive Safety Glass—Flat & Bent)

GROUP 4—**Cleated Panel Boxes.**
FIRST PRIZE—Melvin C. Koester, Libbey-Owens-Ford Co.
(Cleated Corrugated Pallet Container)
SECOND PRIZE—Kenneth W. Montgomery, Douglas Aircraft Co., Inc.
(Diorama Airplane Model)

GROUP 5—**General.**
FIRST PRIZE—Charles L. Foy, GM's Detroit Diesel Engine Div.
(Full Injector Assembly)

LIGHTER VERSION

The White Motor Co. has announced that its new model 3014, shown above, is now in production. This lighter version of the White 3000 series with the power-lift cab augments current models in heavy and light-heavy service, and is engineered to specific needs of delivery service.

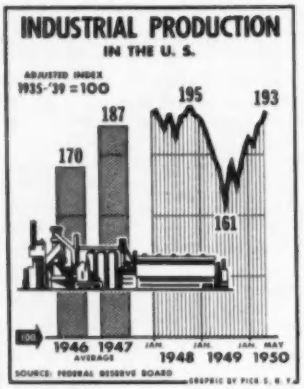
SECOND PRIZE—E. S. Schneider, Rohm & Haas Co.
(Primal)

GROUP 6—**Export Packages.**
FIRST PRIZE — Gale C. Cunningham, North American Aviation, Inc.
(T-28 Elevator)
SECOND PRIZE—Wilburn Couch, GM's GMC Truck & Coach Div.
(Engine Intake Valves)
THIRD PRIZE—Louis A. Holder, Timken Roller Bearing Co.
(Timken Tapered Roller Bearings)
HONORABLE MENTION — Wilburn Couch, GM's GMC Truck & Coach Div.
(Engine Overhaul Gasket Set)

GROUP 7—**Materials Handling.**
SECOND PRIZE—H. D. Woughter, GM's Chevrolet Parts Div.
THIRD PRIZE—S. S. Beekman, International Harvester Co.

Winner of the Harold Jackson Award Trophy, annually offered by Wm. H. McGee & Co., Inc., marine underwriters,

News of the AUTOMOTIVE INDUSTRIES



was Louis A. Holder of Timken Roller Bearing Co., Canton, O., for his export protective packaging of Timken Tapered Roller Bearings. Honorable mention was given to Wilburn Couch, GM's GMC Truck & Coach Div., Pontiac, Mich. The Irving J. Stoller Award for outstanding interior packaging was won by Gale C. Cunningham of North American Aviation, Inc., Los Angeles. Honorable mention was given to: Charles L. Foy, GM's Detroit Diesel Engine Div.; Harry Hunt, Burroughs Adding Machine Co., Detroit; and D. E. Rewolt, Automatic Pump and Softener Corp., Rockford, Ill.

Campbell, Wyant and Cannon Makes 5.3 Millionth Liner

The Campbell, Wyant and Cannon Foundry Co., Muskegon, Mich., recently produced the 5.3 millionth cylinder liner, an average of 1 million a year centrifugally cast in the company's No. 6 plant which was opened in 1945.

Automobile Makers Oppose Dropping Fifth Tire

Automobile manufacturers have gone on record as opposing any move at this time to bar shipment of a spare tire with new automobiles. They state that the present practice is the most efficient and economical method of delivering the necessary fifth tire to the customer. There have been reports from Washington that NPA, at the request of independent tire dealers, has been considering elimination of the fifth tire with the sale of new cars as a conservation move. The automobile builders point out that without tire rationing, new car buyers would undoubtedly purchase a new spare tire at a cost greater than would be the case if they acquired it with the new car and that exactly the same number of tires would be used.

Tunis Named to Manage New Chrysler Plant

W. G. Tunis has been named operating manager of the new parts plant being built at Indianapolis by Chrysler Corp. Dodge division will operate the new plant which will manufacture transmissions. Mr. Tunis has been factory manager of the company's steel parts manufacturing plant at Kokomo, Ind. Fred E. Parker, former budget supervisor at the Kokomo plant will succeed Mr. Tunis as factory manager. Cost of the new Indianapolis plant and equipment will exceed $25 million.

Stiff Deferment Policies for Reserves

Stiff occupational deferment policies for members of the reserves and the National Guard have been announced by the Dept. of Defense. While applying only to reserve components, it is expected that the new policy will also be used as guide for deferment of men called up under the Selective Service Act. The basic criteria for deferment of reservists are the Dept. of Labor list of critical occupations and the Dept. of Commerce list of essential activities, both of which were released at the same time the new policy was announced. Basically, the reservist deferred must be engaged in a critical occupation necessary to a highly essential activity and he will be deferred only until he can be satisfactorily replaced in that occupation. The three military services will administer the new policy as it affects their respective reserve components.

Deferments in all cases will be made on an individual basis and may be terminated at any time because of overriding military considerations. Deferments for dependency are not included in the criteria, inasmuch as members of reserve components are liable for call to active duty in time of need. Initial deferments of reservists in critical occupations in essential activities may not exceed a period of six months, and no extension may be for more than a period of six months. The Dept. of Labor list of critical occupations is broken into two parts: professional and skilled occupations. Part of the professional occupation list and the complete skilled occupation list follows:

PROFESSIONAL AND RELATED OCCUPATIONS

Architect, Marine; Chemist—includes analytical, biological, organic, physical, inorganic, pharmacognosist, pharmacologist; Engineer—includes chemical—includes only chemical, ceramic; civil, electrical, industrial, mechanical, mining, petroleum, sanitary; Chief, marine; Geologist—includes geologist and geophysicist; Shipmaster; Metallurgist—includes, extractive, physical; Tool and Die Designer—includes only die designer, tool designer.

SKILLED OCCUPATIONS

Aircraft and Engine Mechanic—Includes only aircraft mechanic, aircraft-engine mechanic; airplane mechanic; Apprentice (critical occupations only); Boilermaker—includes boilermaker, lay-out man, fit-up man, boilershop mechanic; Boilermaker, marine; Bricklayer, refractory; Coremaker; Driller, petroleum—includes cable driller, Rotary driller; Die Setter; Electrician, airplane; Foremen (critical occupations only); Glass Blower, laboratory apparatus; Instrument Repairman—includes only instrument repairman, aircraft instrument man, electrical instrument repairman; Lay-out man, Marine; Loftsman—includes only loftsman, marine, mock-up assembler, loftsman, aircraft, boilermaker-loftsman; Machinist—includes machinist, bench machinist, instrument maker, laboratory mechanic, lay-out man, marine machinist, job setter; Maintenance mechanic; Millwright; Model maker; Molder—includes only bench molder, finish-molder, floor molder, pattern molder; Patternmaker; Precision Lens Grinder—includes only lens grinder, lens polisher; Roller, iron and steel; Ship Rigger; Stillman, Petroleum processing; Tool and Die maker — includes only die maker, tool maker, tool & die maker.

Credit Controls Slow Used Car Sales

With reimposition of stringent credit controls, used car sales have fallen off considerably. Dealers believe that demand for late model used cars will drag until prices come down further.

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers.

CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

Nat'l Lub. Grease Inst., Chicago, Oct. 30-Nov. 1

Amer. Soc. Body Engrs. Technical Convention, Detroit .....Nov. 1-3

Ind. Management Soc. Management Clinic, Chicago .....Nov. 2-3

American Petroleum Institute Annual Mtg., Los Angeles .....Nov. 13-16

1st Annual "Motorama," Los Angeles .....Nov. 16-19

Power & Mech. Engineering Exposition, New York City ...Nov. 27-Dec. 2

Nat'l Standard Parts Assoc. Convention, Chicago .....Dec. 1-2

Auto. Service Industries Show, Chicago .....Dec. 4-8

SAE Annual Mfg. & Engineering Display, Detroit .....Jan. 8-12

Nat'l Assoc. Engine & Boat Mfrs. Nat'l Motor Boat Show, New York City .....Jan. 12-20

Plant Maint. Show & Conf., Cleveland .....Jan. 15-18

Soc. of Plastic Engrs., New York City .....Jan. 18-20

4th Annual Hot Rod and Motor Sports Show, Los Angeles ..Jan. 25-28

Inst. of the Aeronautical Sciences, New York City .....Jan. 29-31

Nat'l Auto. Accessory Mfrs. Assoc., New York .....Feb. 5-8

SAE Passenger Car Body & Materials Mtg., Detroit .....Mar. 6-8

International Auto Salon, Geneva, Switzerland .....Mar. 8-18

Amer. Soc. Tool Engrs., New York City .....Mar. 17

Pacific Automotive Show, Seattle Mar. 21-24

Salone Internazionale Dell Automobile, Turin, Italy .....Apr. 4-15

Amer. Soc. Lubricating Engrs., Phila. .....Apr. 16-18

Amer. Mgt. Assoc., Nat'l Packaging Expos., Atlantic City .....Apr. 17-20

Materials Handling Conference, Chicago .....Apr. 30-May 4

A.E.R.A. Convention, Chicago ....May 7-9

Nat'l Air Races, Cleveland Airport May 19-20

Amer. Society for Quality Control, Cleveland .....May 23-24

Chamber of Commerce Annual Mtg. Washington, D. C. .....Apr. 30-May 2

Dodge Div., Chrysler Corp.—The appointment of **Louis J. Ouellette,** to the newly-created post of director of dealer advisory conference, has been announced.

Willys-Overland Motors, Inc.—**Donald T. Ellis** has been named to the administrative post of fleet and truck sales manager.

Export Div., Chrysler Corp. — Announcement has been made of the appointment of **Wendell H. Welch** to the position of operations manager of the div.

General Motors Corp. — **Kenneth Meade** has been appointed director of personnel of the new General Motors Technical Center. **Edwin L. Yates** will succeed **Mr. Meade** as director of the college relations and personnel placement section of the Central Office Personnel Staff.

Ford Motor Co.—Appointment of **A. H. Masset** as General Manager of the company's operations in Uruguay has been announced.

Mack Trucks, Inc.—**A. R. Kelso** has been elected vice president and at the same time named vice president and a director of Mack Manufacturing Corp., a wholly owned company subsidiary.

The Hanson - Van Winkle - Munning Co.—**G. E. Verstegen** has been appointed to the company's staff of equipment sales engineers.

Westinghouse Electric Corp. — The appointment of **L. R. Ludwig** as assistant to the vice president, has been announced. **William H. Morse** has been appointed manager of the ac mechanical engineering section in the Transportation and Generator Div.

The Four Wheel Drive Auto Co.—The appointment of **Donald B. Olen** to the newly created position of Works Manager has been announced. **Clarence Piehl,** formerly manager of the cost department, has been named executive assistant to **M. O. Stockland,** director of sales.

Carboloy, Inc.—The appointment of **S. B. Strom** to the newly established post of comptroller has been announced. **H. H. Jason** has been named manager of tool sales and **J. D. Kennedy,** manager, wear parts sales.

Lear, Inc.—The appointment of **C. E. Willis** as Chief Engineer has been announced. **Arthur W. Eichmann** has been appointed to the sales engineering staff.

Diamond Machine Tool Co. — Announcement has been made of the reappointment of **J. K. Sutherland** to the position of sales manager.

The Vision-Visor Corp. — Announcement has been made of the appointment of **E. F. Aylward** as general sales manager.

Monsanto Chemical Co., Merrimac Div.—**Roy T. Cowline** has been appointed consumer products sales manager.

Frank Mayer & Associates—**G. Russell Noble** has been appointed Administrative Engineer.

Chefford Master Mfg. Co., Inc.—**S. J. Somberg** has been appointed to the post of general Sales Manager.

The Tomkins-Johnson Co.—The appointment of **Walter Donnelly** as works manager has been announced.

Firestone Industrial Products Co.—The appointment of **John H. Palmer** as manufacturers sales manager, Detroit, has been announced.

Howell Electric Motors Co.—**B. W. Wescott** has been elected Vice-President.

The Massey-Harris Co.—The following changes have been announced: **W. K. Hyslop,** Pres. of the Racine Co., has retired; **James S. Duncan** is chairman

(*Turn to page 78, please*)

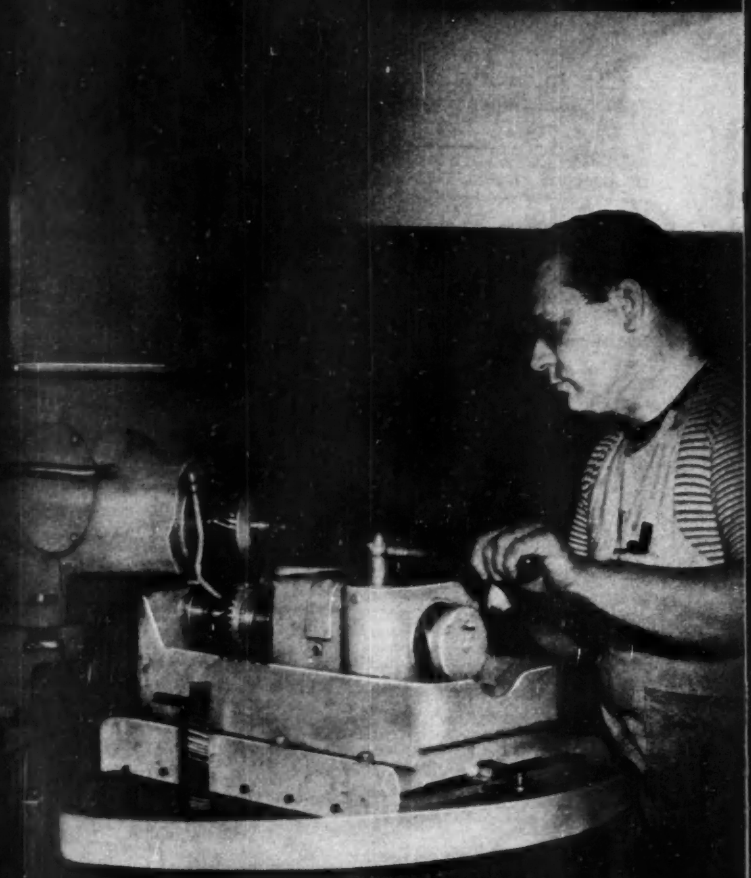
Necrology

Alvin J. Musselman, 77, inventor of a bicycle brake, braking system for B-29 bombers, and a superballoon tire, died in Santa Barbara, Calif., on Oct. 11.

George Sessions Case, 68, chairman of the executive committee, Lamson & Sessions Co., died in Cleveland, O., on Oct. 11.

John J. Raskob, 71, former vice president and director of General Motors Corp., and the E. I. du Pont de Nemours & Co., died on Oct. 14 in Centreville, Md.

Raymond Steele Cady, 54, sales manager, GM's Detroit Transmission Div., died recently in Detroit.



It's DOLLARS you'd be *Shaving...*

Consider the seconds saved, the operating ease and tool-life economy of Fellows "Full Tool" Shaving! We'd be glad to tell you where you can see Fellows No. 8 "Full Tool" Shaving Machines doing their daily job of shaving dollars, out of the costs of gear finishing.

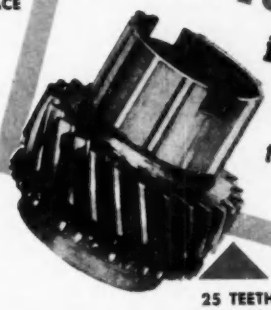
You may not have gears of the exact characteristics of the 9.4334/10 normal pitch, 32° helix angle gears below. But your time savings will be in direct relation.

The angular tool application of Fellows "Full Tool" method utilizes higher reciprocating speeds and provides exceptionally free cutting with greater accuracy. Cost wise, there is substantially less tool wear, and much longer tool life between resharpenings. That saves real dollars!

For time and cost estimates, or for descriptive literature, get in touch with the nearest Fellows Office listed below.

34 TEETH
27/32" FACE

"FULL TOOL" SHAVED
in 28 seconds each
to lead limits of ± .0002"
to involute limits .0 to + .0004"



25 TEETH
13/16" FACE

27 TEETH
13/16" FACE

Fellows

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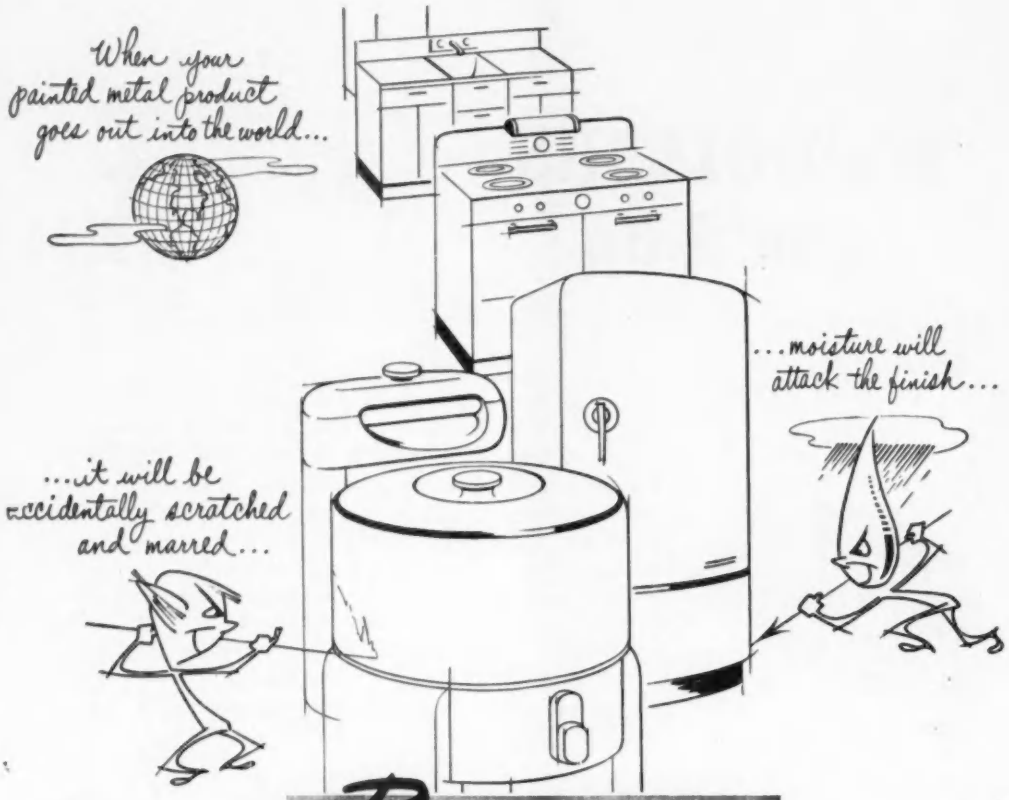
When your painted metal product goes out into the world...
...it will be accidentally scratched and marred...
...moisture will attack the finish...

Better put BONDERITE under the paint to guard the finish and keep your product looking its best!

This is the corrosion resistant paint base that's doing a big job for manufacturers of painted metal products. On finished products from automobiles through the list to kitchen food mixers, Bonderite under the paint adds qualities that protect the paint finish, prolong fine appearance, promote customer satisfaction.

Bonderite is dependable, uniform, simple to control, adaptable. Its cost is low for the benefits it delivers.

Your product should have the protection of Bonderite. Write for full information.

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— on 2,000 Atlas balls and 156 SKF bearings

Tucker Sno-Cat Corporation, Medford, Oregon, builds sturdy machines that buck the densest drifts and safely carry men and materials through raging blizzards. To insure trouble-free operation of the patented sliding pontoons, Sno-Cat "uses more steel balls and ball bearings than any other motor vehicle"... 156 Double-Row Deep Groove Ball Bearings and 2000 ⅜-inch steel balls. The decision to use SKF Double-Row Deep Groove Ball Bearings and Atlas Steel Balls was sound. SKF Bearings are fully protected from inevitable snow and mud in this rugged job... Atlas Steel Balls by SKF are uniform. SKF rigidly controls every step in the manufacturing process... devotes the same expert skill to the production of both the most complex bearing and the precision steel ball. Result: you can always rely on SKF for trouble-free dependability.

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA., *the Pioneers of the Deep Groove Ball Bearing—Spherical Roller Bearing—Self-Aligning Ball Bearing.* 7082

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8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

Integrity — Craftsmanship — Metallurgy — Tolerance Control

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The Modern Method of Valve Actuation

Millions of Zero-Lash Hydraulic Valve Lifters and Zero-Lash adjusting units—designed and developed exclusively by Eaton Manufacturing Company—have gone into leading automotive, aircraft, tractor, marine and industrial engines in the last 17 years. They have contributed:

- Freedom from Tappet Adjustments for the Life of the Engine.
- Accurate Valve Timing and Perfect Seating at All Engine Speeds and Temperatures.
- Longer Life for Valves and Seats.
- Silent Valve Train Operation.

Since 1932 Eaton Engineering Departments have been engaged in constant research and development of improved designs and of new wear-resistant materials which make today's—and tomorrow's—Zero-Lash Hydraulic Valve Lifters the truly modern method of valve actuation.

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TODAY ...DESIGNED FOR A SPECIFIC JOB

TOMORROW ...ADAPTABLE TO OTHER PRODUCTION

Conversion Costs Reduced To Minimum

Especially designed for a particular job *today,* the W. F. and John Barnes 924 Vertical Machine, because of its unusual adaptability, will also produce a wide variety of other "special" machining jobs on a production line basis *tomorrow.* Designed for increased efficiency and economy of operation and high production runs, the W. F. and John Barnes Vertical Machine can be converted to handle other production jobs. Only new fixtures and re-tooling will be necessary.

All W. F. and John Barnes Machines are built to order for specific jobs. But, our engineers, well-versed in solving special machining problems, are able to design machines that are versatile and can be adapted to other machining work at a minimum cost.

Your metal-working problems may lend themselves admirably for high production on W. F. and John Barnes Vertical Machines. Our engineers will be glad to assist you in your selection of equipment for present-day and post-war production.

JOB RECORD

In this well-known manufacturer's plant, the W. F. and John Barnes 924 Vertical Machine operates in a cycle of rapid approach, bore and chamfer to depth (positive stop), feed-out face and rapid return, with push-button remote control for starting the cycle.

The piece — an axle housing rough casting requires rough, semi-finish, finish boring and chamfering 15⅝" diameter; and rough, semi-finish and finish 17¾" diameter face. A special holding fixture supplied by the customer, facilitates this work. The entire time consumed for these various machining operations, performed on ONE W. F. and John Barnes Vertical Machine, is 7½ minutes.

Our four page bulletin illustrates how the 924 Vertical Machine has been applied to a number of different types of high production drilling, boring and facing operations. This is a bulletin you should have in your files — write for a copy today — Ask for Bulletin No. 545.

W. F. and JOHN BARNES

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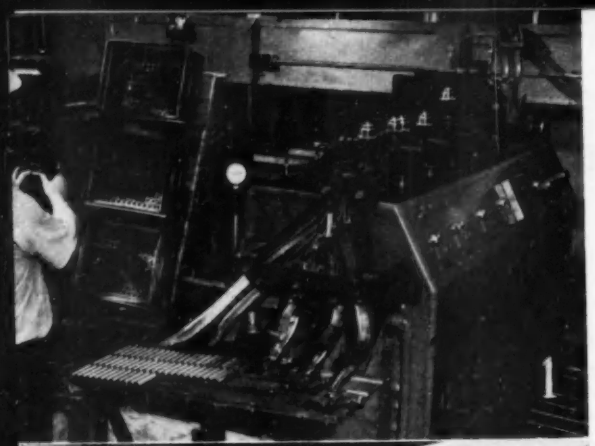


1. *Here is a perspective of one of the two Merz electronic piston pin inspection machines at Ford. The feeder conveyor may be seen in the background. Accepted and graded piston pins are distributed through the chutes seen in this view onto the inclined table in the foreground. The operator then places the pins in special tote boxes. Rejects come out through chutes on the left hand side of the Merz machine.*

2. *Valve seat inserts are inspected electronically in this machine. Part of a battery of mechanically-operated machines used for some years at Ford, the unit shown here has been fitted with a Merz attachment and control cabinet. The hopper at the extreme right feeds rings through the magazine to the gaging head. One of the rings may be seen on the anvil which is located at the left below the box of rings.*

Automatic

LITTLE more than a year ago Ford Motor Co. introduced through all divisions a formal procedure of statistical quality control which has been extended by now to over 91 per cent of manufacturing and assembly departments. It is of interest that Ford adopted the simple control chart method found so effective in other industries.

With the application of statistical quality control Ford has emphasized that 100 per cent inspection is by no means a foolproof method. Trouble is that inspectors, no matter how seasoned, still are subject to fatigue on repetitive operations. It has been found in industrial sampling tests that a given lot subject to 100 per cent inspection can be screened four times and still contain some off-standard parts. Statistical control, on the other hand, can be relied upon to hold to a given measure of risk and assure acceptance within any desired limits—say in the range of one to two per cent as an economical figure.

Quality control to be effective requires proper training of operators and supervision. It implies control of every element of the process, including the condition of machinery, properly ground and adjusted tools, control of materials and their heat treatment, etc.

In essence, quality control has become an outstanding management tool when properly applied. It makes for operating economy of high order, assures maintenance of engineering standards, and reduces scrap and rework. To gain maximum effectiveness, Ford management is rapidly replacing the conventional types of gaging devices such as plug, snap and ring gages and other manual inspection equipment with indicator or recording type gages which reveal how good or how bad a piece is and show in which direction the quality trend is moving.

In place of manual inspection on selected parts requiring close dimensional control, Ford is developing inspection devices of electric, electronic, and air gaging type wherever such equipment can be applied economically. Where applied currently, such devices not only have assured improved quality levels but have reduced inspection costs to a fraction of previous ex-

Devices Reduce Inspection Costs

By Joseph Geschelin

perience. Modern automatic gaging devices require the very minimum of supervision, permitting inspection personnel to be shifted to other and more interesting jobs. Too, they speed productivity greatly and assure conformity to established standards since the machine coldly accepts or rejects without exercising judgment.

Although the program is young, several examples of automatic gaging devices of recent origin will illustrate the scope and possibilities of the current policy.

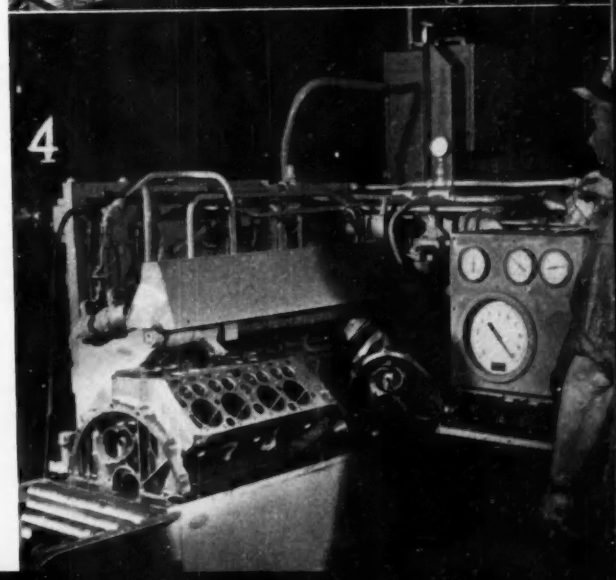
Consider the gaging of piston pins, required in enormous quantity. For many years Ford used a mechanical type automatic gaging machine. Now this has given way to a unique electronic machine developed for Ford by the Merz Engineering Co. of Indianapolis. Two of these machines already are in use. They are fully automatic in operation and require no operator attention except to make sure that nothing goes wrong. Each one is capable of inspecting 2800 pins per hour. Work is fed to the machines automatically by means of a chute having four individual slides so that two slides feed each machine.

The machine has six gaging stations with a reject chute at each station to discard unacceptable pieces. The robot stations are controlled electronically to reject the pin if it does not conform to the established limit. The sequence of operations is as follows:

1. Scleroscope reading (80 min.)
2. Surface finish (six-microinches, rms)

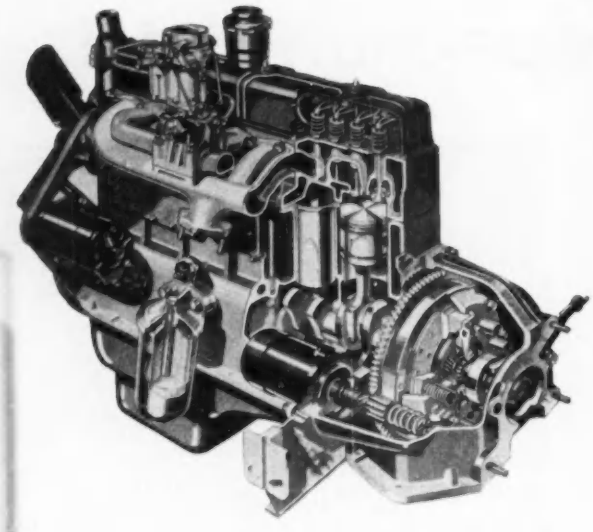
(*Turn to page* 64, *please*)

3. *One of a number of Sheffield Multichek machines for inspecting pistons automatically. Capable of inspecting 800 pistons an hour this machine performs simultaneously 12 gaging operations. It classifies piston pin bores in three sizes; while skirt diameter is graded in eight sizes, varying by steps of 0.0003 in.*



4. *Close-up of Moore air-test fixture for testing cylinder blocks for water tightness. It is a fast accurate method said to be more satisfactory than previous practice at Ford.*

Many Export Vehicles
at Britain's



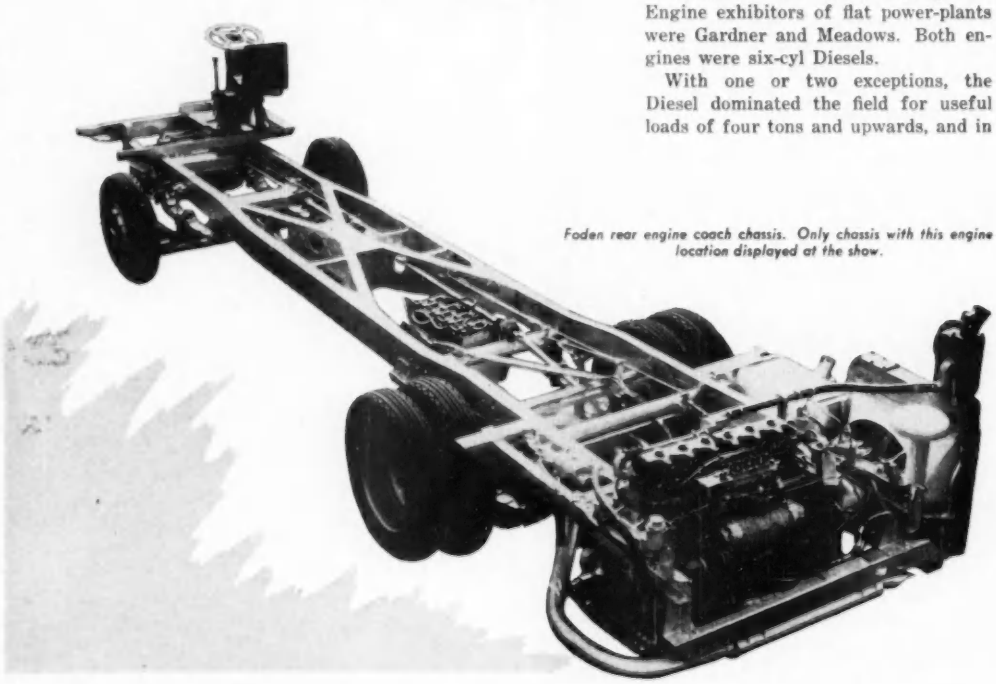
Bedford (General Motors) six-cyl engine. Its maximum governed speed is 3000 rpm.

London, England.

BRITAIN'S Commercial Motor Show, with 429 exhibitors, of which 42 were vehicle manufacturers, had a pronounced export aspect. Many of the vehicles displayed were designed and produced more with a view to conditions abroad than at home.

The outstanding technical feature was the trend toward under floor engines for coaches and buses. Chassis of this type were shown by A.E.C., Atkinson, Crossley, Dennis, Guy, Leyland, Maudslay, and Sentinel. In addition, Commer showed a steeply inclined forward-mounted engine, which allowed the driver to be placed above it, and Fodens had two chassis with rear transverse-mounted engines, one type being the firm's six-cyl supercharged two-stroke Diesel, and the other a six-cyl Gardner. The two are interchangeable. Engine exhibitors of flat power-plants were Gardner and Meadows. Both engines were six-cyl Diesels.

With one or two exceptions, the Diesel dominated the field for useful loads of four tons and upwards, and in



Foden rear engine coach chassis. Only chassis with this engine location displayed at the show.

Commercial Motor Show

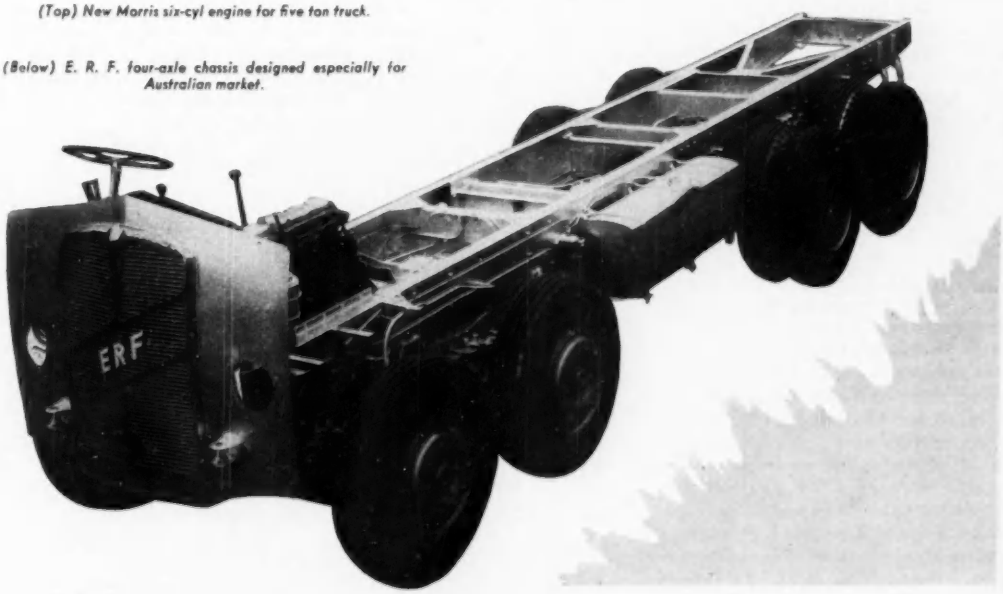
By W. F. Bradley
Special European Correspondent for AUTOMOTIVE INDUSTRIES

the bus and coach sections. Up to 250 cu in. the gasoline engine offered some competition. Above that size there was none.

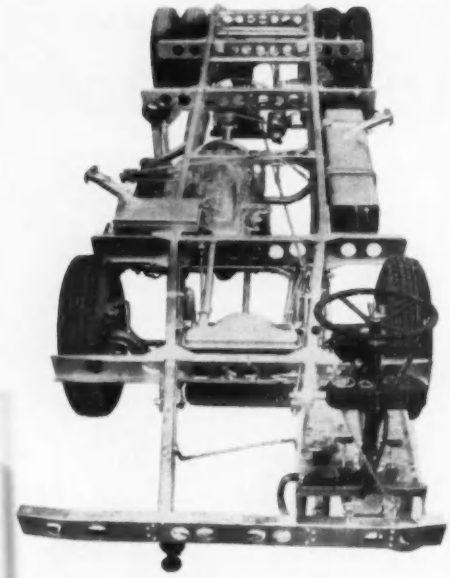
Particular interest attached to the transverse rear engine Foden, the only one of its type in England. With a rear overhang of 89 in., and a wheelbase of 198 in., the entire overall length of 29½ ft is available for passenger carrying, the last row of seats being above the engine. The Foden supercharged two-stroke was seen for the first time at the show held two years ago, and was described at that time. This, however, was its first appearance in a bus chassis. It is interchangeable with the standard Gardner 512 cu in. four-stroke Diesel, developing 112 hp. The Foden supercharged two-stroke, of 250 cu in., has an output of 126 hp at 2000 rpm and, by reason of an extensive use of light alloy in its construction, is 400 lb

(Top) New Morris six-cyl engine for five ton truck.

(Below) E. R. F. four-axle chassis designed especially for Australian market.



Britain's Commercial Motor Show



A. E. C. offset flat Diesel coach chassis with fluid drive and preselective transmission.

lower in weight. The engine has three-point attachment in the frame, with the radiator mounted outside the right-hand frame member and the fuel tank carried just ahead of it. An open clutch housing is bolted on the flywheel housing, allowing for easy adjustment or complete removal of the clutch. This housing contains a spiral bevel, right angle drive with a slight gear reduction. A standard four-speed gearbox, with constant mesh gears and engagement by dog clutches, is used, the drive to the underslung worm rear axle being through a short shaft with Spicer universals. An epicyclic stepdown also was shown. It provides a total of eight speed combinations.

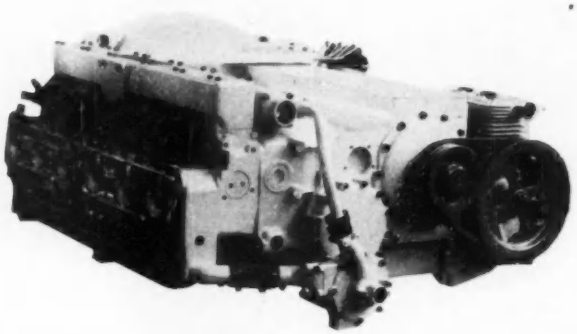
Dennis presented the Dominant underfloor engined bus chassis with a six cyl Diesel of 463 cu in., mounted centrally, the right-hand frame member having an upward sweep, to allow the cylinder heads, exhaust and intake manifolds, as well as injectors, to be placed under and outside it. A feature of this chassis is the adoption of the Hobbs semi-automatic four-speed transmission. This was seen at the last show, but its use had not then been taken up by any manufacturer. The transmission is of the planetary type with hydraulic clutches. The final drive combines an Eaton two-speed axle.

A.E.C. had the Regal Mark IV coach chassis with a 585 cu in. six-cyl Diesel engine developing 125 hp at 1800 rpm. The engine and transmission are offset to the right of the chassis to improve accessibility, and a feature is a built-in lifting tackle, by the use of which, it is claimed, an engine can be removed in 13 min and reinstalled in 24 min by two operators. As in the case of the conventional vertical models, this chassis has the fluid flywheel, Wilson epicyclic gearbox, and underslung worm rear axle. Crossley now being under A.E.C. control, makes use of the same engine, and the same applies to Maudslay.

Sentinel showed a single deck bus chassis with underfloor engine and in addition a range of two and three-axle trucks with Sentinel-Ricardo four and six cyl underfloor engines. This appears to be the only firm having underfloor engine mounting for a truck.

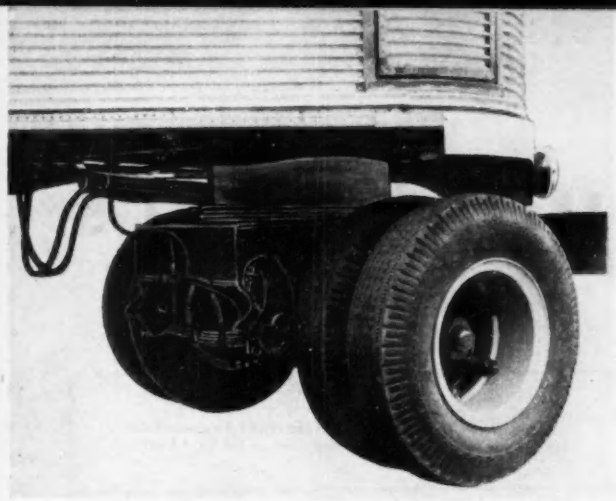
Two of the leading engine manufacturers, Gardner and Meadows, presented horizontal Diesels. The Gardner is a six-cyl of 512 cu in. developing 112 hp at 1700 rpm. Maximum torque is 358 lb-ft at 1300 rpm and is held at practically that figure over the 1100 to 1500 rpm range. It is claimed that this year's models show an increase of 10 per cent in power output at the same crankshaft speed and a 5 per cent improvement in specific fuel consumption. Pistons are a new design of low expansion alloy and compression rings are chromium plated. For heavy duty service a gear type scavenger pump, driven from the injection pump camshaft, circulates the lubricating oil through an external cooler. This engine is fitted in the Guy coach chassis, with fluid flywheel and preselective gearbox, and also in the Atkinson truck and coach chassis.

(*Turn to page 72, please*)



Meadows six-cyl, 130 hp horizontal engine.

Fageol Super Freighter

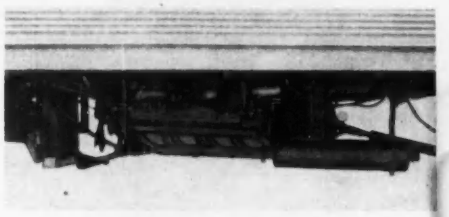


For the dual front wheel unit, a Fruehauf fifth wheel assembly, Gemmer steering mechanism, and a Vickers hydraulic booster are used. The front suspension utilizes semi-elliptical leaf springs.

TWIN COACH CO. in cooperation with the Fruehauf Trailer Co. has developed a new cargo carrier, the Super Freight, that utilizes a Fruehauf trailer and a Fageol horizontal in-line engine. The engine is the same underfloor unit that is used for present Twin buses, and it is said to develop from 162 to 250 hp depending upon the compression ratio and the type of fuel—gasoline or propane.

In addition to the engine, Twin Coach will also handle the installation of the driver's compartment, transmission, axles, brakes, steering, and other mechanical components. A unique feature is the dual front wheel truck that utilizes a Fruehauf fifth wheel assembly with Gemmer steering mechanism and Vickers hydraulic booster.

The fifth wheel unit incorporates semi-elliptical leaf springs while the rear wheels will have torsion bar suspension. Westinghouse air operated brakes will be supplied.



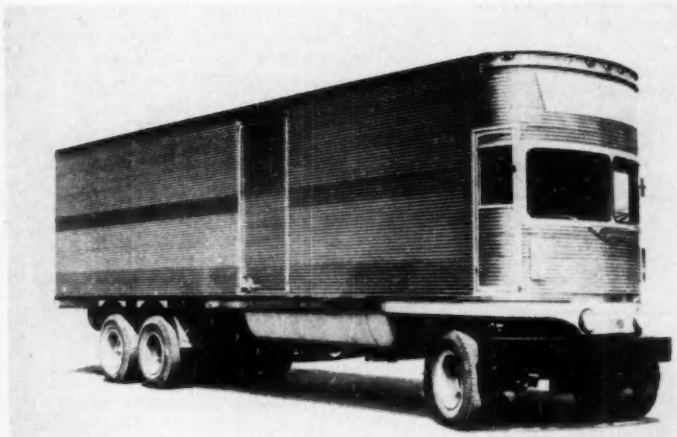
This view shows the underfloor mounting of the six-cyl horizontal in-line Fageol engine. Depending upon the fuel used—gasoline or propane—and the compression ratio, the engine is said to develop from 162 to 250 hp.

When propane is specified, an Ensign-Fageol fuel system operating from a 106-gal tank will be furnished. For gasoline, standard equipment consists of a mechanical fuel pump incorporating a filter and a 100-

(*Turn to page 92, please*)

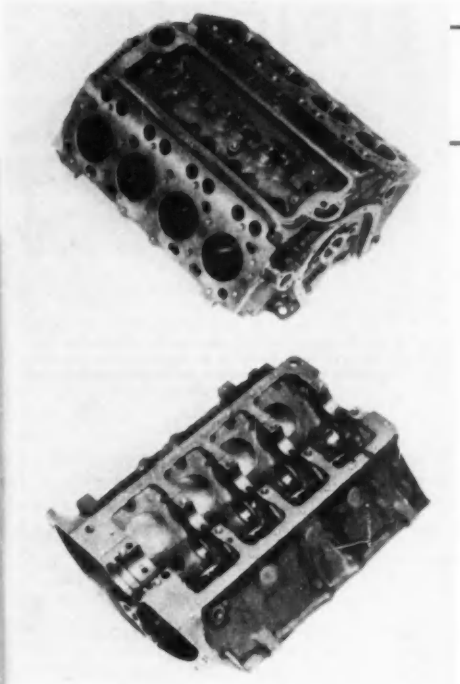
Specifications

Weights	
Vehicle net weight—no load	17,500 lb
Payload capacity	33,000 lb
Vehicle Dimensions	
Overall length—bumper to rear	35′
Overall width	8′
Overall height	12′ 3″
Wheelbase—to first axle	20′ 10″
Wheelbase—to second axle	25′
Tread	7′ 11¾″
Turning radius—left or right	39′ 6″
Dimensions of Cargo Space	
Inside length	31′
Inside length—including space over cab	34′ 4″
Inside width	7′ 6″
Inside height	7′ 8″
Height of space over cab	2′ 2″



Fageol's new Super Freighter, Model GT-55 utilizes a Fruehauf trailer and a Fageol underfloor engine. This model can carry a 33,000 lb payload in an overall length of 35 ft.

Studebaker's



Top and bottom views of the compact and rigid V-8 cylinder block. It carries five main bearings with thrust taken on the No. 1 bearing.

Of interest to everyone in the automotive industries is the announcement by Studebaker Corp. that an overhead valve, 90 deg V-8 engine will be standard equipment in the 1951 Commander line. This move was made after looking into future requirements and considering the desirability of an eight-cylinder engine capable of outstanding performance at present-day road speeds, coupled with good fuel economy.

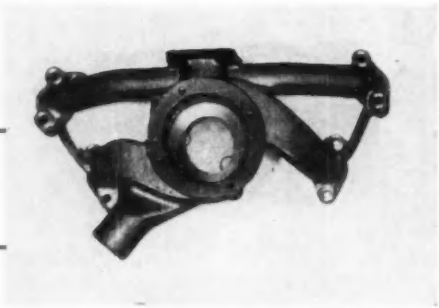
Since the new engine had to be tooled from the ground up, engineering design has been coordinated with advanced manufacturing technique so as to effect the most economical production set-up consistent with the new machinery selected for the purpose.

Planning for years in advance, the engineering department feels that the basic design to be described here can remain unchanged with the expected availability of the so-called super-fuels up to a compression ratio of as much as 14 to 1. At the start of production this engine will have a compression ratio of 7 to 1 and will operate with complete satisfaction on regular fuel.

Referring to the condensed specifications table, it will be noted that the V-8 with a displacement of 233 cu in., has a stated bhp of 120 as compared with the former six-cylinder engine developing a maximum of 102 bhp with a displacement of 245 cu in. This comparison of itself provides an impressive commentary on the relative character of the new engine.

Perhaps the best way to describe this new engine—for easy visualization—is to consider the major elements, one by one, with reference to the principal cross-sections reproduced here.

The one-piece cylinder block is heavily ribbed and



Closeup of new water pump body showing integral construction including the inlet and outlet branches to each bank of the cylinder block.

New Engine

By Joseph Geschelin

Overhead Valve, V-Eight Develops 120 Hp With a Piston Displacement of 233 Cu In. Basic Design Can Remain Unchanged When Compression Ratio Is Increased as Higher Octane Fuels Become Available

said to have unusual structural stiffness. Since the block is specifically designed to facilitate surface broaching operations on the top and crankcase surfaces, one of the principal reasons for extreme rigidity is to resist distortion due to heavy broach pressures. It is obvious that stiffness satisfactory for this purpose becomes more than adequate for handling the loading within the engine under operating conditions.

The crankshaft is of five-bearing type with four throws and six counterweights, and fitted with a rubber mounted vibration damper. To gain additional rigidity and consequent endurance, the crankshaft is so designed as to provide adequate overlap of pins and journals. Thrust is taken on the No. 1 main bearing. Main bearings are of interchangeable type, steel-back, with a micro-lining of babbitt alloy. All main bearings are of 2½-in. nominal diameter with clearance ranging from 0.0006 to 0.0027 in.

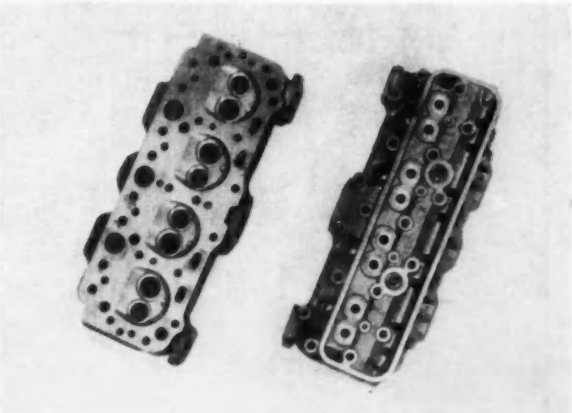
Valve gear, as illustrated, is of simple conventional design with a barrel type cast iron tappet. Quietness is achieved through proper design, control of clearances and back-lash in the mechanism, in combination with cams of special form featuring an unusually long ramp. Intake valves are of chrome-nickel steel alloy for the head and stem, with head diameter of 1 13/32 in. Exhaust valves are composite with SAE 2112N for the head and 731 steel composition for the stem.

Condensed Specifications

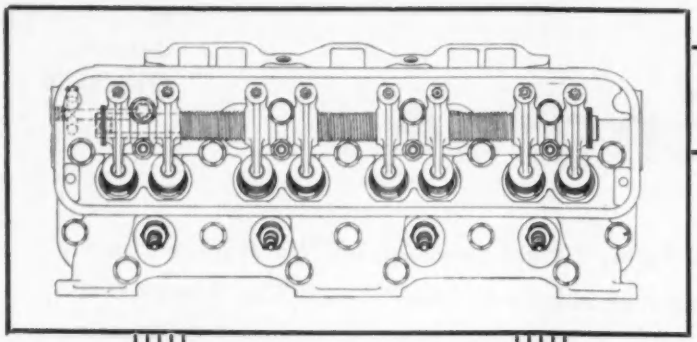
Type	Valve-in-head
Cyl arrangement	90 deg Vee
No. cyl	8
Bore (in.)	3⅜
Stroke (in.)	3¼
Displacement (cu in.)	232.6
Compression ratio	7 to 1
Bhp (max)	120 @ 4000
Torque (max) lb ft	190 @ 2000
Comp. pressure (150 rpm) psi	120 to 140
No. main bearings	5

Head diameter of the exhaust valves is 1 9/32 in.

Tappet clearance for both intake and exhaust is 0.016 in. cold. Angle of seats is 45 deg. Stem to guide clearance is held to 0.0015-0.0035 in. The stem end is



Top and bottom view of interchangeable cylinder heads for new V-8 engine. Note that combustion chambers are machined all over.

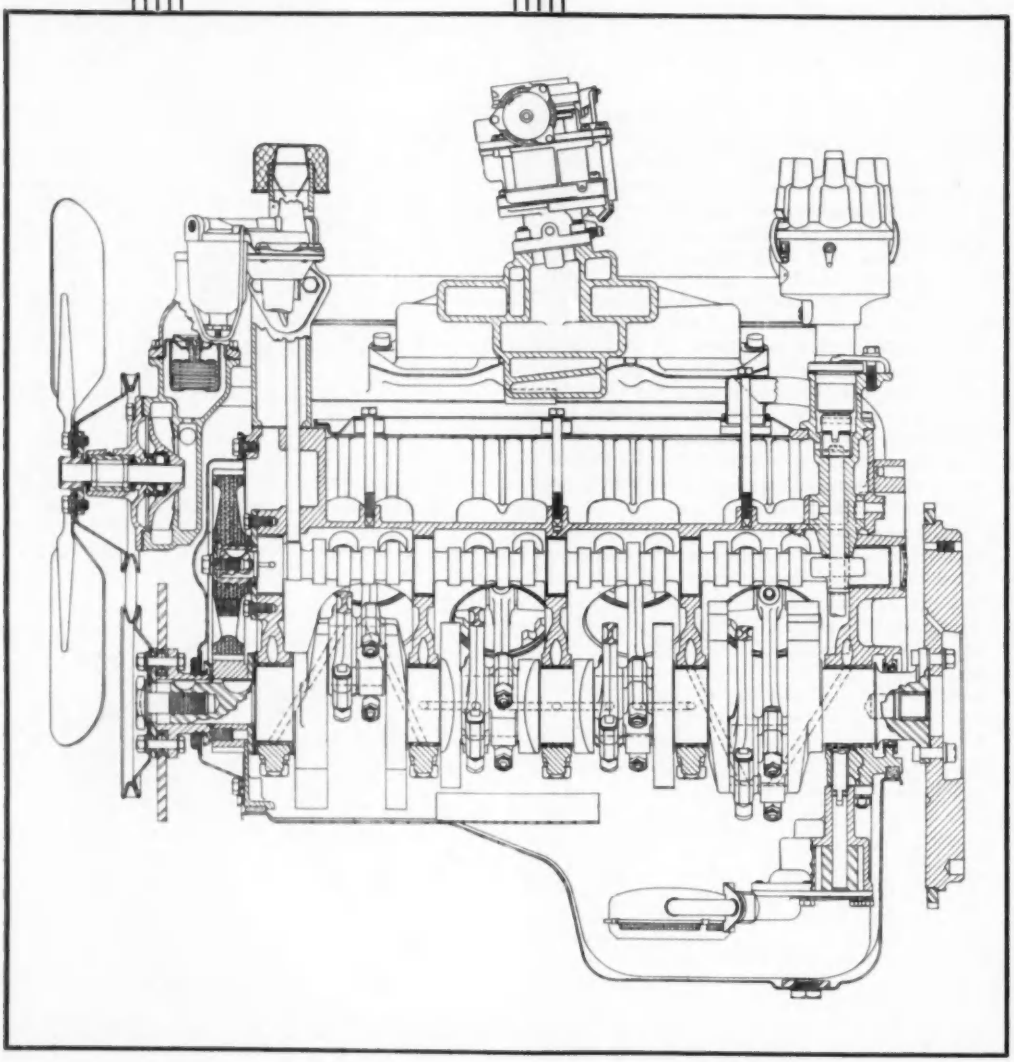


Studebaker's New Engine

(Left) Cylinder head and valve mechanism. Heads are interchangeable right and left.

(Bottom of this page) Longitudinal section of the new engine.

(Bottom of next page) Cross section of the engine showing details of pistons, manifolds, valves, etc.



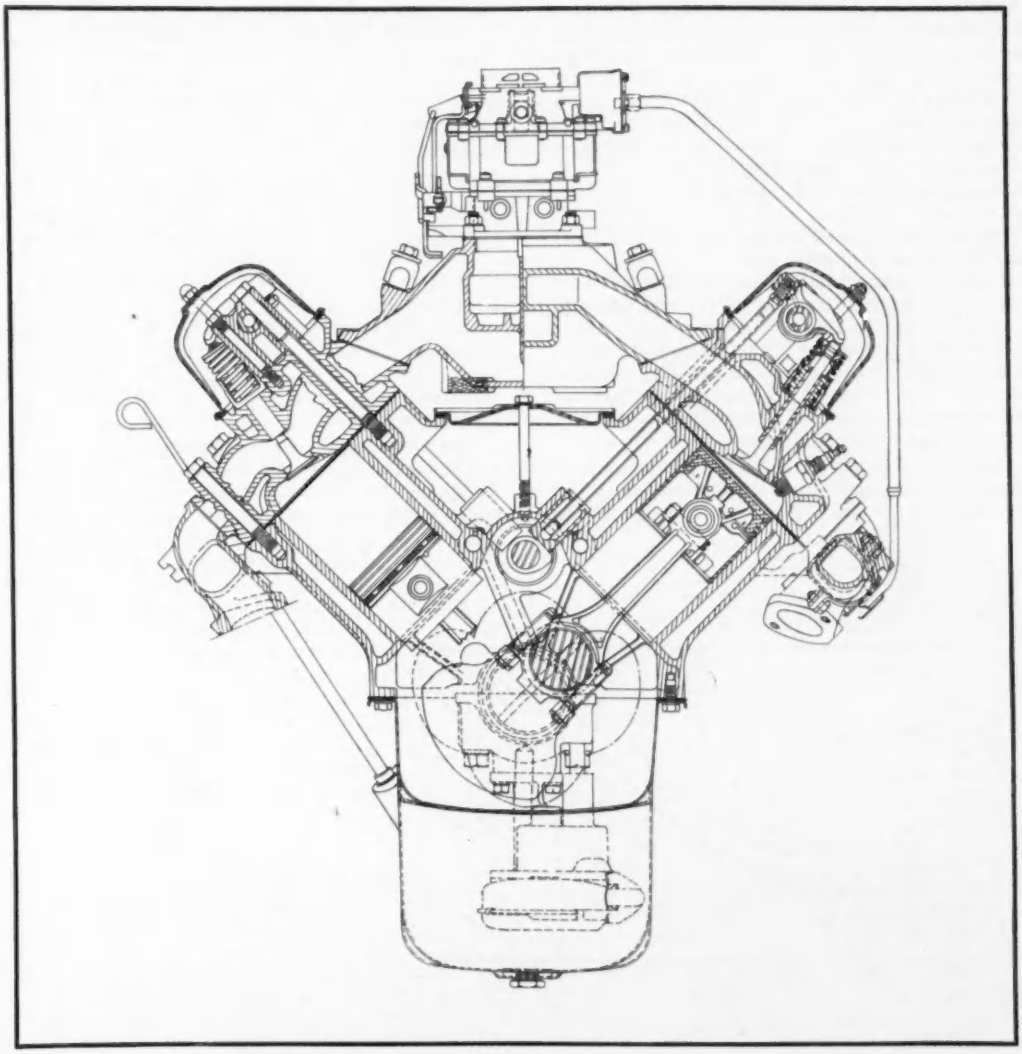
of double groove type. Intake valves are shrouded, as shown, to prevent leakage of oil. One of the important features of the valve mechanism is the provision of full pressure lubrication at all points, including the rocker arms.

A noteworthy feature of the valve train is the adoption of a self-locking type adjusting screw on the rocker arm. This simplifies obtaining of accurate valve lash adjustments at assembly and in the field. Valve springs are of conventional type and are fitted with vibration dampers.

The timing of this engine with 0.020 in. tappet clearance is as follows: Intake opens 11 deg before tdc; intake closes 53 deg abc; exhaust opens 50 deg bbc; exhaust closes 14 deg atc.

The camshaft, mounted on five steel-back, babbitt-lined bearings, is driven by a gear train consisting of a Celeron gear in mash with a cast iron gear.

Cylinder heads are designed to be interchangeable right and left, thus simplifying manufacturing and service requirements. They are suitably water-jacketed, as illustrated, to provide complete cooling around the valves. The illustration shows the simple combustion chamber design which is said to be in full accord with current knowledge. Combustion chambers are machined. Spark plug location is critical in an engine of this type and the plugs have been placed in accordance with experimental procedures. Champion H8, 14 mm plugs are standard, with gap ranging 0.0325-0.0375 in. (*Turn to page* 78, *please*)



Designing Cars for Economy

By V. Boghossian
Research Engineer
Kaiser-Frazer Corp.

GENERALLY, motorists consider the engine as the main factor affecting gasoline mileage in an automobile, but actually the vehicle itself determines the economy basically through its shape, dimensions and weight. Fuel consumption is essentially controlled by the overall design of the car and not by the engine alone. So, two radically different automobiles equipped with the same engine will have entirely different fuel consumption characteristics.

The problem of analyzing potentialities for producing economical cars has as its purpose the examination of some of the possibilities of automotive manufacturing techniques within the limits of our present knowledge —possibilities for making further improvements leading to substantial reductions in operating costs of passenger cars. From an engineering viewpoint this achievement is logical and possible on the basis of streamlining and weight reduction.

Operating costs of automobiles are determined principally by two factors: The weight of the car and its air resistance. In Fig. 1 curves are presented giving the values of rolling coefficients for tire pressures as a function of car speed. To point out the importance of both rolling and air resistance, let us compare two different cars with identical performance; the first a conventional 1949 six-passenger car, the second a car with the same overall dimensions but weighing less and having an aerodynamically improved body shape with consequent reduction of drag by 50 per cent. Let us assume that the principal specifications of these two cars, A and B, are:

	A	B
Wheelbase, in.	120	120
Frontal area, sq ft	26	26
Dry weight, lb	3300	1840
Engine, hp	110	65
Max speed, mph	90	90
Tire pressure, psi	24	24

We can base our analysis on these figures, which are not impractical as we shall see further in this study. Fig. 2 shows the roadload and engine power curves for cars A and B respectively. A breakdown of the roadload curves for each car is presented in Fig. 3. Thus, it is obvious that a significant reduction of weight in conjunction with highly efficient streamlining can improve in large measure car performance, or considerably reduce the power required.

Assuming that these outstanding results can be obtained within the limits of

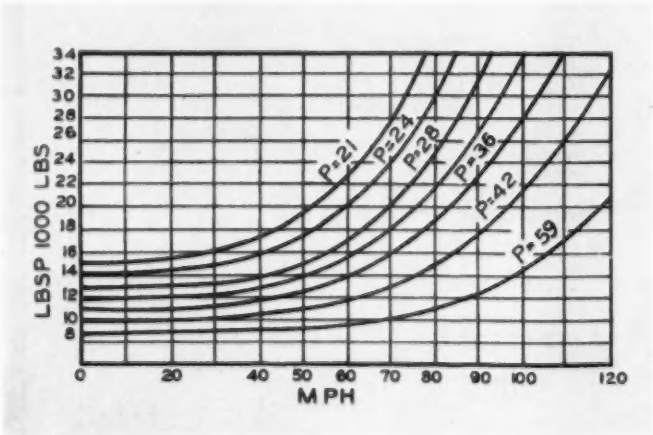


Fig. 1—Rolling resistance in lb per 1000 lb for various tire inflation pressures in psi.

and Performance

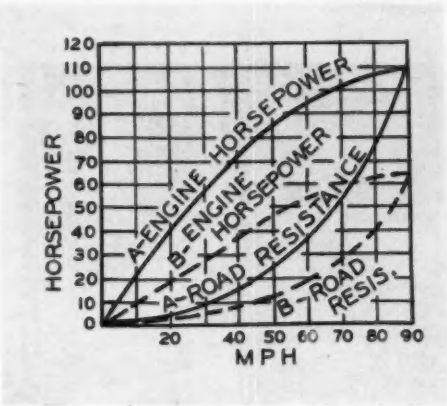


Fig. 2—Engine horsepower and road resistance for cars A and B.

our present knowledge, the question arises as to whether we need to go that far in the design of automobiles of the future. Other objections might be raised also such as: Light vehicles are unstable on the road, especially on curves. Light automobiles have poor riding qualities. Extremely light design requires long development and experimental work. At average road speeds the aerodynamic factor is not important for passenger cars. Fuel economy is a secondary consideration for more than 80 per cent of the motorists.

Now we shall try to analyze these different objections and see how serious they are. Is it reasonable that a 4000 lb automobile powered with a 150 hp engine operating most of the time with driver only, should carry continually 2000 lb excess weight, using more fuel and tires, with little practical advantage? With the help of the curves of Figs. 2 and 3 we can ascertain the cost of wasted fuel as more than $400 in traveling 50,000 miles.

It is indeed an old belief that heavy vehicles hold the road better at high speeds than do light vehicles. Let us review some of the considerations relating to the general problem of road equilibrium with which automobile engineers are well acquainted. (a) The stability of a vehicle running on a straight flat road is affected when inertia forces act on its center of gravity and produce force couples. (b) These couples are balanced by the moments that are formed with respect to the *CG* by friction forces, which are static forces, between wheel and road. (c) The inertia forces, or dynamic forces, are always proportional to the acceleration of the *CG* and the mass of the vehicle, while friction forces are proportional to the loads on the wheels. (d) For a given mass of the car, the main factors which affect the general equilibrium conditions are, therefore, the wheelbase, the tread, and the height of the *CG*. (e) In turning, the centrifugal force (a dynamic force) is balanced by the sum of the frictional forces (static forces) of the four wheels.

With W total weight, V the speed of the car, R the turning radius and f the coefficient of friction between tire and pavement, the centrifugal force is given by the equation:

$$F^c = \frac{MV^2}{R} = \frac{WV^2}{gR}$$

Skidding is always prevented when the following condition is obtained:

$$F^c < fW$$

$$\text{Or: } \frac{WV^2}{gR} < fW$$

(*Turn to page 84, please*)

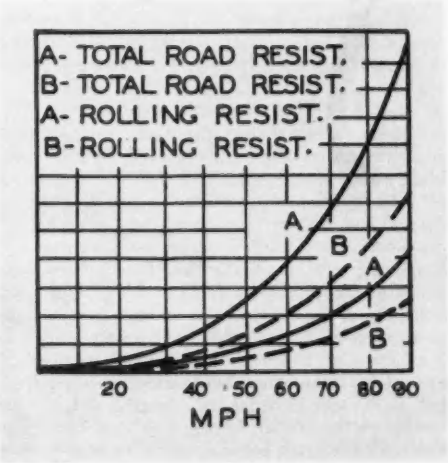
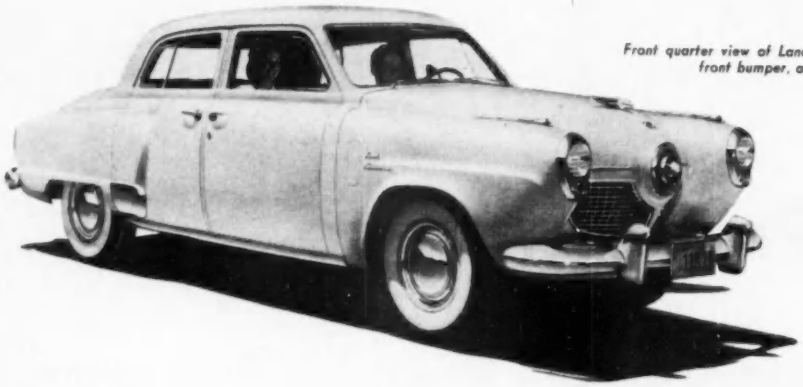
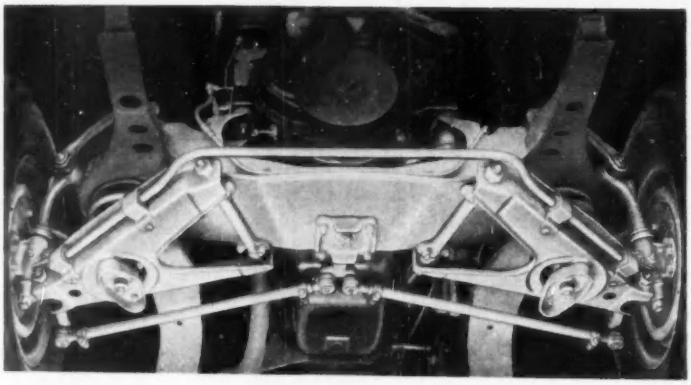


Fig. 3—Rolling and total road resistance for cars A and B.



Front quarter view of Land Cruiser showing new grille, front bumper, and bumper guards.



Underside perspective of front suspension and new center-point steering linkage.

THE most dramatic aspect of the 1951 Studebaker announcement is the introduction of the V-8 engine in the Commander and Land Cruiser models (see engine description in this issue). While the body structure remains unchanged, the three basic models—Champion, Commander, and Land Cruiser—have been provided with entirely new box section frames incident to a change in wheelbase. For 1951 both Champion and Commander models are mounted on a 115-in. wheelbase chassis, while the Land Cruiser is 119-in. This compares with 113, 120, and 125-in. wheelbases last year.

Although bodies remain the same basically, some evident change in exterior appearance has been effected by the introduction of a new radiator grille treatment. In addition, all models feature entirely new bumpers, bumper guards, and tail light treatment.

Considering the new V-8 engine and other mechanical changes to be noted, the 1951 line features many noteworthy improvements from a design standpoint. Among the major changes are the details of the suspension system. For one thing the new models boast the adoption of four-leaf 2½-in. width semi-elliptic rear springs, interchangeable on all chassis. They are fitted with special inter-leaf inserts of extruded polyethylene formulation having a molded outside edge which seals the space between leaves to prevent entry of dirt and water. Springs are mounted on Harris rubber shackles.

The wide springs have greater lateral stability, making possible the elimination of the rear sway bar on the Champion and Commander, weigh less than conventional multiple-leaf springs, and are said to give a better ride.

Direct action shock absorbers, used on the Champion heretofore, now are standard on Commander and Land Cruiser chassis, with sea-legs mounting at the rear. As a design improvement the upper and the lower arm of the front suspension on all models is now a one-piece stamping. At the same time the caster has been made minus 1¾ deg on all models.

Similarly the brake and clutch pedals now are made of stampings. It is of interest that the combination of weight saving in the springs, front suspension, and in other details has resulted in a weight reduction of 205 lb for the Commander; and about 55 lb for the Champion.

The Champion engine remains basically unchanged but has been fitted with a new oil pan to provide clearance for centerpoint steering which is standard on all models in 1951. The Champion also offers the Studebaker automatic drive as optional equipment.

Steering ratio on the Commander has been increased with a new Ross cam and twin lever gear.

With the reduction in weight of the Commander chassis, brake size has been correspondingly decreased at the rear. The Commander now has 11 by 2 in. brakes at the front, 9 by 2 in. at the rear. The Champion has 9 by 2 in. brakes both front and rear. Studebaker continues the use of Wagner Electric hydraulic brakes of self-centering, self-adjusting type. Brake loading on the Commander is 62 per cent at the front, 38 per cent at the rear. On the Champion is it 57 and 43 per cent.

Spicer semi-floating rear axles are of the same basic design as before but are entirely new because of the introduction of a new differential carrier capable of accommodating a wider range of gear ratios. The range of ratios is as follows:

Automatic transmission—3.54 to 1.

Standard transmission gear ratio—4.09 (Commander), 4.1 (Champion).

Overdrive transmission gear ratio—4.56 to 1.

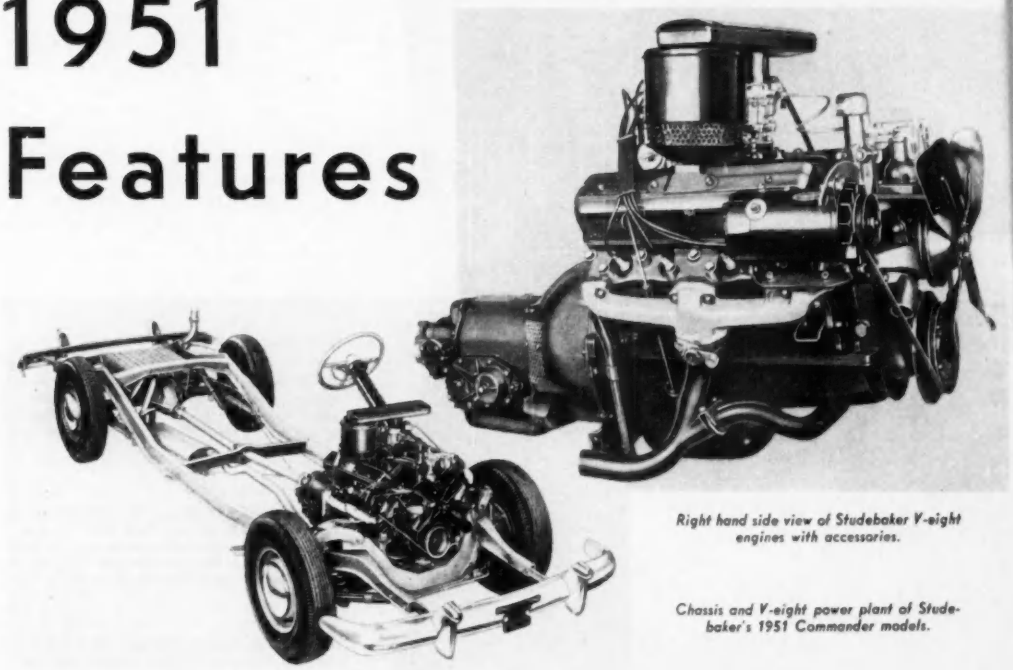
In addition, the mounting of spring pads has been changed to accommodate the wide rear spring.

Wheels on the Champion have been changed from a four stud mounting to five studs, together with an increase in the bolt circle.

Although the drive line remains basically the same, with two propeller shafts in combination with a rubber-mounted mid-ship bearing, the length of shafts has been changed to make up for the difference in wheelbase.

Delco-Remy electrical equipment is standard on the Commander engine; Auto-Lite on the Champion. The Carter 1¼ in. downdraft carburetor remains standard on the Champion engine while the 1⅛ in. Stromberg AAUVB-26 carburetor of dual downdraft type is standard equipment on the Commander V-8 engine, which does not require premium gasoline, Studebaker engineers point out.

Studebaker's 1951 Features

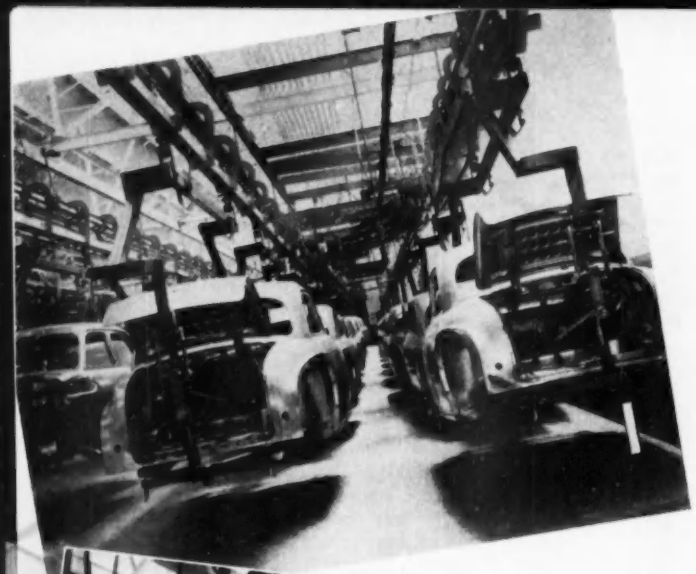


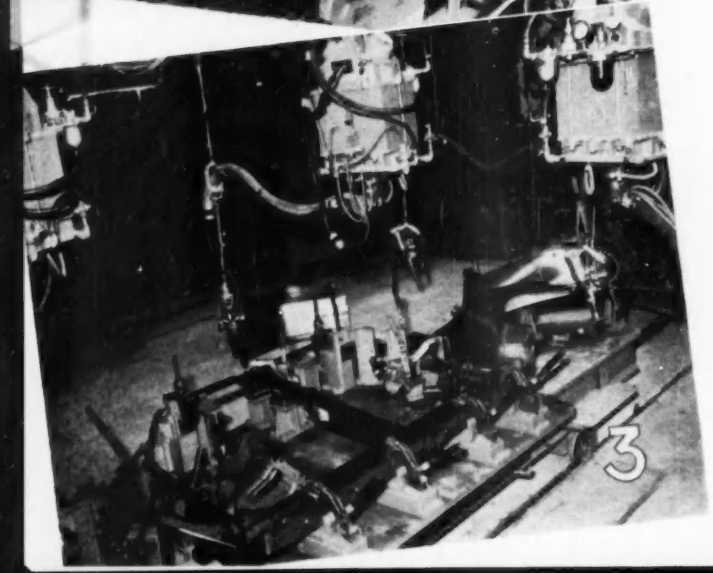
Right hand side view of Studebaker V-eight engines with accessories.

Chassis and V-eight power plant of Studebaker's 1951 Commander models.

De Soto's Eight

By Joseph Geschelin





SCENE of historic automotive activity in the past, the enormous Warren Ave. plant of De Soto Division, Chrysler Corp., boasting a floor space of 1,100,000 sq ft, has been modernized and readied to take its place as one of the most advanced body building plants in the industry. The interior has been remodeled completely, tastefully painted, and provided with fluorescent lighting, thus making working conditions pleasant and safe. The plant has a capacity of 60 bodies an hour and will operate on two shifts.

Keynote of bodymaking here is found in the miles of monorail conveyors and conveyors of other types—about eight miles in all—skillfully synchronized in their movement at the final stages by means of electronic controls. Materials handling is designed to organize the flow of parts and sub-

1. *At the end of the metal finishing line bodies are hooked onto trunnion type cradles suspended from heavy monorail conveyors. These conveyor attachments permit turning the bodies in any position to facilitate painting.*

2. *An example of modernity in conveyorized assembly operations is the seat and seat back trim line. The seat frame is transported on massive carriers suspended from the overhead conveyor while trimmers build up the seat back assembly in successive steps.*

3. *Here is a close-up of the merry-go-round for welding body side panels into an integral structure. This conveyor too has ten framing fixtures.*

Body Plant Has

Miles of Conveyors

assemblies in rhythm with teletypewriter scheduling from the planning department.

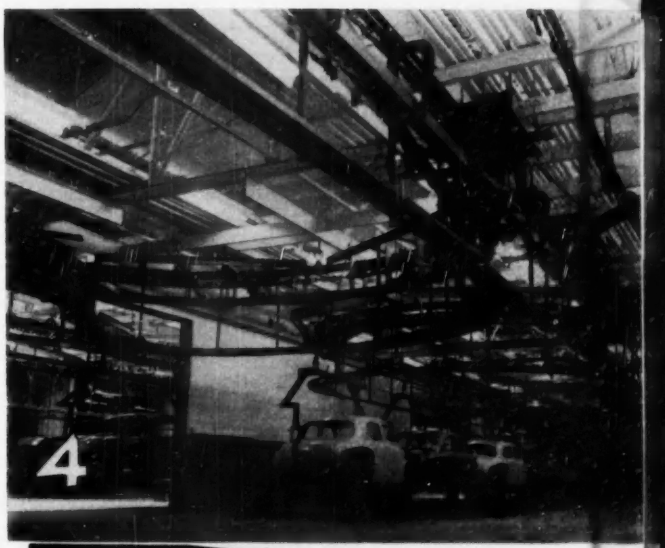
One of the most impressive features of this operation is a fully automatized body painting operation, easily among the largest and most advanced to be found in the industry. It is fully automatic in cycle from metal cleaning and rustproofing to finish-enamel drying. Fresh air is supplied to the paint department at the rate of 1,640,000 cu ft per minute. More complete information on this installation will be given in a subsequent issue of AUTOMOTIVE INDUSTRIES.

So extensive is this body operation that we shall confine the present study to a highspotting of some selected features, supplementing the brief word picture with photographs taken at interesting points.

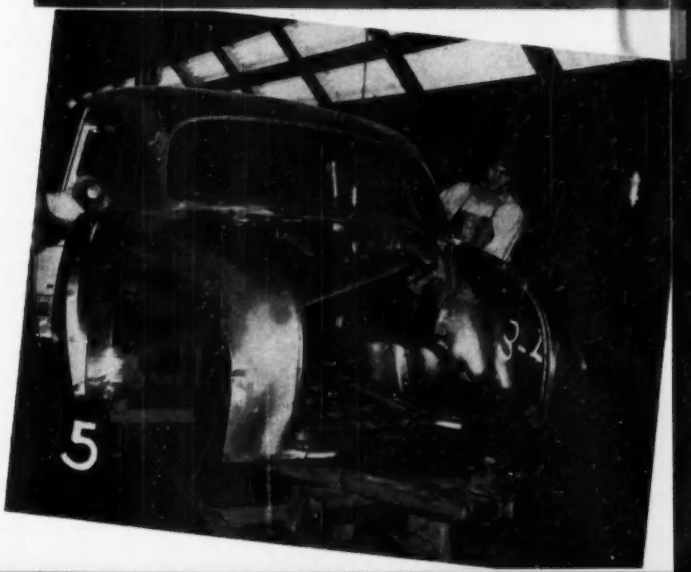
Stampings for body fabrication are delivered to the Warren plant, the initial stage taking place in an impressive welding department equipped with familiar hydraulic multispot automatic welding machines. As an example of this consider the group of three multi-spot welders for producing underbodies. The first unit completes the welding of reinforcements and attachments to the front section while the third unit does a similar job on the rear section. The front and rear sections then move inwardly to meet at the center machine to produce an integral underbody. The center welder handles a total of 198 spot welds at one time.

As the underbody is completed, it is slid out of the welder onto a tubular frame which guides it close to floor level, facilitating its installation in a trunnion fixture suspended from the monorail feeder conveyor.

The roof panel assembly and the right and left hand



4. *Grand Central Station—marshalling junction for distribution of finish-painted bodies to two-tone, to repair, to trim line, and to overnight storage. When routed to the trim line bodies move through the opening in the wall at the left. Of particular interest is the method of transporting bodies on the massive hangers which permit movement of work 360 deg about the trunnion.*



5. *As mentioned in the text, the body plant boasts a unique booth on the body-in-white line where metal polishing and buffing operations are handled. Pressure ventilation coupled with water-wash curtains on the sides provides an excellent atmosphere for worker comfort.*

Eight Miles of Conveyors

6. *Largest of the merry-go-round conveyor lines is the one shown here. This is the body framing line on which ride ten of the enormous welding fixtures, providing the backbone for building up body assemblies.*

side panels are fabricated completely on individual merry-go-round assembly conveyor lines, each one having ten fixture stations. Similarly initial body framing is done on a much larger merry-go-round conveyor, fitted with ten massive body framing fixtures riding the conveyor line. Welding is done on all four merry-go-round lines with suitable portable guns served from individual transformers and controllers mounted overhead.

Immediately following body framing, the welded shell is securely fastened to a body dolly having the same conformation as the chassis frame and made ready for the body-in-white line. An interesting feature of conveyor through body-in-white is perhaps the first use of a neat flush type chain which runs level with the floor and free from obstructions of any kind. As bodies approach the area of gas welding operations, flow is directed through two large welding booths which are provided with an updraft of fresh air under high pressure to keep the atmosphere clean and free from dirt and fumes.

The conveyor then continues under canopies extending beyond the welding booths where soldering operations are performed. The canopies too are provided with a powerful overhead exhaust system for updraft ventilation.

Farther along the line bodies again enter two big ventilated booths, providing comfortable working conditions for grinding and polishing of sheet metal. The combination of forced draft ventilation with filtered air and water-wash curtains at the side walls is said to result in working conditions superior to any other method used by the company in the past.

Continuing on the body-in-white line, we reach the area where doors are hung and trunk lids attached. At this point a monorail feeder conveyor approaches the

(*Turn to page* 68, *please*)

Eight Miles of Conveyors

Trim Department

TYPE			Length (ft)
Conv.	"E" —O.H.—	Instrument panel	572
	"F" —O.H.—	Spring delivery	1813
	"G" —O.H.—	Seat frame	775
	"H" —O.H.—	Finish front seat	382
	"K" —O.H.—	Club Coupe front back	560
	"L" —O.H.—	Trim parts delivery	916
	"M" —O.H.—	Garnish mold	1855
	"N" —O.H.—	Spring pad and rubber	1600
O. H. Carousel	—Rear backs		146
O. H. Carousel	—Front backs		242
O.H. Carousel	—Front seat—4-door		268
O.H. Carousel	—Front and rear cushion—4-door		224
O.H. Carousel	—Front seat—2 door		170
Flat Top	—Instrument panel assembly		200
Belt	—Rear back button		100
Belt	—Cushion regulate		100
Belt	—Front back button		240
Belt	—Door fastener assembly		170
Belt	—Carry-all panel		140
Floor	—Trim line		2272
	—Flat top		200
	Total		12,945

Paint Department

Paint Dept.	Power and free	20,360
	Final OK repair	620
		20,980

Body in White

O.H. Con.	—Under body welding	410
O.H. Con.	—Major body side—roof and underbody	1900
O.H. Con.	—Door and deck L10	1400
Floor Carousel	—Roof assembly	190
Floor Carousel	—Body side-right	210
Floor Carousel	—Body side-left	210
Floor Carousel	—Major body assembly—2-door	260
Floor Carousel	—Major body assembly—4-door	260
Floor	—Final assembly—2-door	1504
	Transfer conv.	76
Floor	—Final assembly—4-door	1632
	Transfer conv.	76
		8,128

Mercury's 1951

Line Has Automatic Transmission

LONG-AWAITED word on the availability of the automatic transmission as optional equipment on the 1951 Mercury line is one of the major features of the announcement by the Lincoln-Mercury Division. To be known as the Merc-O-Matic, this torque converter drive was described completely in AUTOMOTIVE INDUSTRIES, June 15, 1950.

Some notable improvements have been effected in Mercury body structure and eye appeal, resulting in features best visualized from the illustration. Essentially the same body styles are continued—the coupe, four-door sedan, convertible station wagon, and Monterey customized coupe model. Considerable basic change has been made in the body structure by the introduction of new quarter panels, roof panel, and the rear fenders which carry out the side panel profile well past the trunk lid line. These changes have involved a considerable outlay for entirely new dies.

The cars now have the appearance of being much longer than before although actual overall length remains about the same. External appearance is quite distinctive with fresh grille treatment, massive front and rear bumpers of different design, and unique treatment of front aid rear lamps. Interior trim treatment, too, is fresh and distinctive with new hardware items both inside and out.

Incident to the various changes incorporated in 1951 models, total car weight has been increased by some 55 lb in most models.

Due to the larger glass area at the rear and quarter panel, rear body cross sill members have been reinforced to provide for greater rigidity of the structure.

From a mechanical standpoint the Mercury chassis and power train remains substantially the same but has been given the benefit of many detail changes and improvements. The engine is the same in most respects but has many noteworthy improvements. Steps have been taken to provide an even more exact balance of the crankshaft while all main bearings are assembled with selective fits. With improvements in cylinder block materials it has become feasible to eliminate valve inserts for intake valves, retaining inserts for exhaust valves. The fuel pump has a double-acting vacuum booster of increased capacity to improve windshield wiper operation.

On the camshaft the cam profile now has a triple ramp to reduce noise. By locating the automatic choke thermostatic element on the manifold, choke operation is controlled by engine temperature rather than underhood temperature. This prolongs the period in which fast idle remains inoperative after the car has been parked for a short interval.

Another interesting feature is something akin to an anti-stall device. This consists of a fitting screwed into the carburetor body on cars fitted with automatic drive. Its function is to slow down the closing of the throttle valve automatically and thus has the effect of preventing the engine from stalling during parking maneuvers or on fast stops in traffic.

Although the engine is unchanged in specifications, output has been increased to 112 bhp from the previous

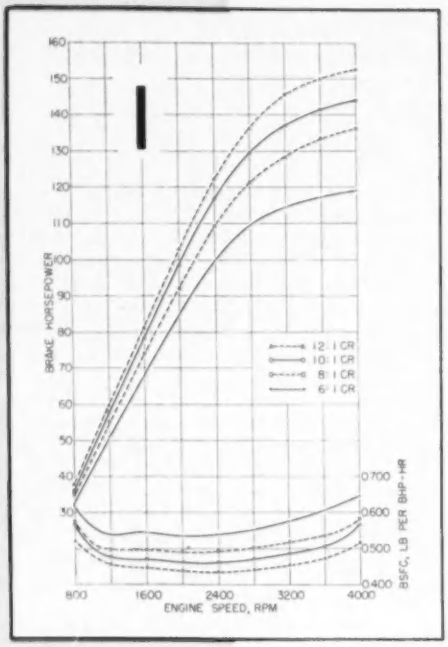
(*Turn to page 76, please*)

This front quarter view of the sport sedan shows the new bumper, grille, and headlamp design.

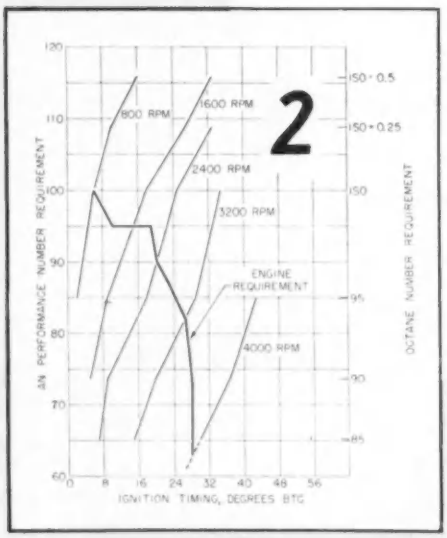
Evaluating

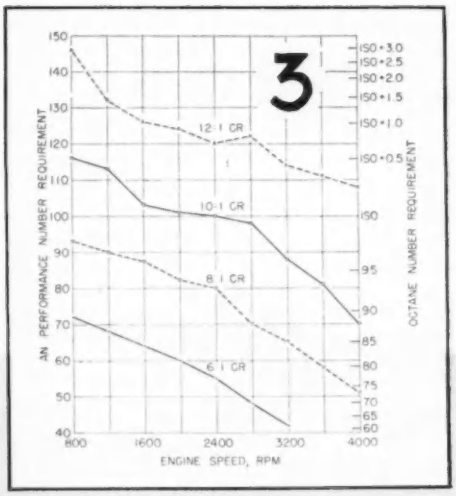
By M. M. Roensch,
Research Supervisor,

and J. C. Hughes,
Research Engineer,
Ethyl Corp. Research Laboratories



EARLY in 1949 the Research Division of General Motors began to make available to the petroleum industry an overhead-valve V-8 engine to be used as a tool for the evaluation of fuels for high-compression engines. Since their introduction, changes have been made in the cylinder heads of these engines to permit better breathing and thereby improve the power at high engine speeds. The eight to one compression-ratio head now incorporates the features of the standard 7.25 to 1 compression-ratio Oldsmobile production cylinder head.





Fuels *for High Compression Engines*

The improved volumetric efficiency of the eight to one design necessitated the same change in the 10 to 1 and 12 to 1 ratios if comparable results of power output and octane-number requirement were to be assured over the whole speed range. This modification was achieved by using intake and exhaust valves with the same head diameters as those used in present Oldsmobile production, modifying the port in the cylinder head, and machining clearance around the inlet valves to permit the incoming charge to flow into the cylinder with the minimum amount of restriction. To extend the range of the effect of compression ratio on engine performance and fuel performance or octane number requirement, another pair of heads at 6 to 1 compression ratio was added to the three pairs of heads already available. These heads which were obtained from Oldsmobile, have the same combustion chamber shape as the eight to one heads.

While this study attempts to show the effect of increasing compression ratio, it must be realized that it is impossible to vary compression ratio alone without disturbing other physical relationships which are important from the standpoint of thermal efficiency and power as well as detonation control. For example, two factors that are likely to change are the surface-to-volume ratio and the quench or squish area.

Before undertaking an investigation of the fuel requirements of any engine, it is important first to examine the engine for performance characteristics, because if the power output is not in keeping with

(*Turn to page* 80, *please*)

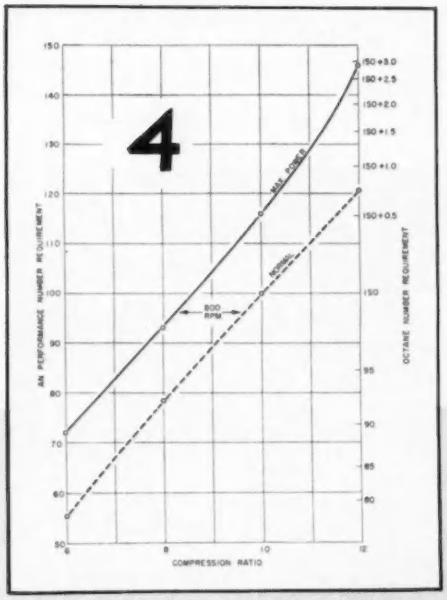
Fig. 1—Brake horsepower and brake specific fuel consumption data of the four compression ratios were obtained for this graph by using a maximum-power air-fuel ratio of about 13 to one and maximum-power spark advance with a non-knocking fuel.

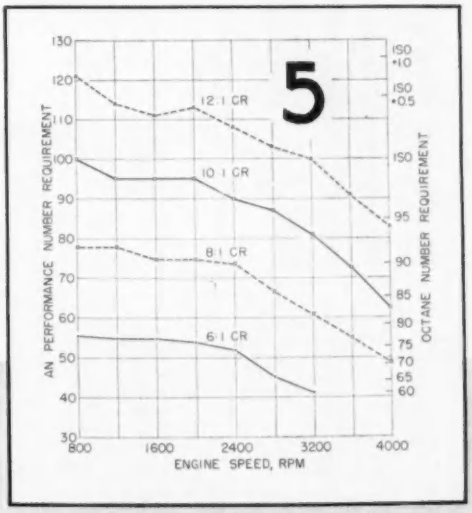
Fig. 2—This graph shows the determination of engine requirement with primary reference fuels over certain speed ranges with varied ignition timing. The heavy solid line is the so-called normal distributor curve which indicates the engine requirement over the speed range with this ignition timing.

Fig. 3—Engine requirement with spark advance and carburetor set at maximum power.

Fig. 4—Effect of compression ratio on requirement with spark advance for maximum power and also with normal spark advance.

Fig. 5—Octane and performance number requirement with normal ignition timing at varied speeds.





Sound Engineering for Quieter Automobiles

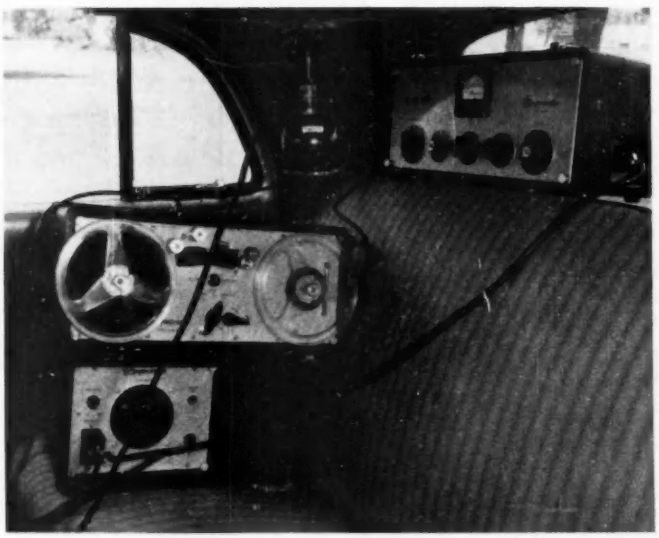
AMONG the many activities of the electrical engineering laboratories of Ford Motor Co. is a continuing program of research in the area of acoustics and its translation in terms of building quiet automobiles, free from objectionable noises.

The problem of acoustical insulation of motor cars became most acute with the general introduction of quiet synchromesh transmissions some 15 years ago and has remained a major problem with each advance in producing quieter mechanism. It is a paradox in this field of work that as one element of the car is made quieter, other noises previously masked become accentuated.

Although scientific equipment has been widely employed in automotive laboratories, the aim is always to seek better methods and to take advantage of such new devices as can be obtained commercially or developed in the laboratory. Much of the scientific equipment used at Ford has been designed and built there. One of the latest commercial items—a magnetic tape recorder—was recently acquired and has been invaluable in many phases of acoustical research.

The magnetic tape recorder is an electronic instrument for the recording and play-back of sound, using a magnetic tape made for this purpose.

(*Turn to page* 64, *please*)



Here is a working demonstration of the Magnecorder—magnetic tape recorder—instrumentation set up in the rear compartment of a Ford car used on the Ford proving ground track. The amplifier may be seen mounted on the rear shelf while the recorder and power supply are on the rear seat. Microphones are then located in various places depending upon the nature of the test.

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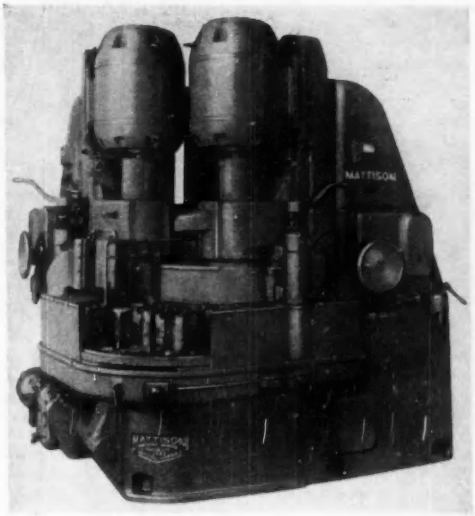
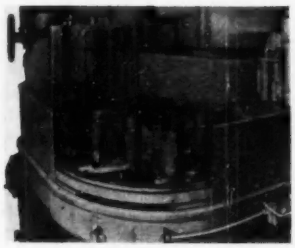


Mattison two spindle automatic rotary surface grinder, No. 24A2, with special fixture

M-53—Two Spindle Rotary Surface Grinder

Recently completed for one of the automotive companies by Mattison Machine Works, Rockford, Ill., is a No. 24A2 two spindle automatic rotary surface grinder equipped with special fixture for grinding the sides of connecting rods.

Pieces are first rough ground by a course grained wheel mounted on the first spindle, after which they are checked by an automatic sizer. Pieces then pass under a fine grained wheel mounted on the second spindle for the finish cut, again being checked by an automatic sizer before being released from the fixture.



Closeup of Mattison surface grinder, No. 24A2

M-54—Light Sensitive High Speed Driller

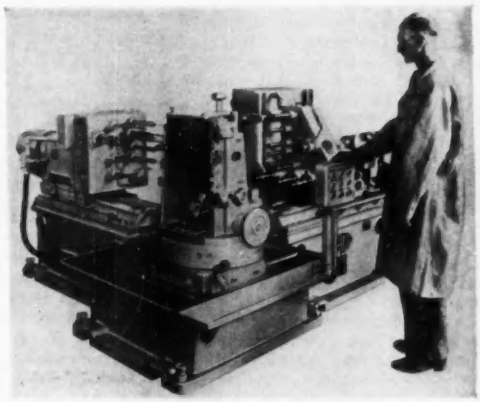
National Automatic Tool Co. of Richmond, Ind., has completed a new automatic high-speed light sensitive driller capable of drilling 1600 small holes in 6 faces of 50 plastic cash register drawers per hr. Hole sizes range from 0.098 in. to 0.199 in., said to be unusual in such high speed work.

Operations of the new NATCO high-speed sensitive driller machine are as follows: At Position One, one part is removed, one part relocated, and one part loaded. At the rear head, location A, face D, two holes are drilled 0.113 in At location B, face B, two holes are drilled 0.1405 in., and four holes are drilled 0.113 in.

At the right hand head, location B, face F, three holes are drilled 0.113 in. and the machine is indexed 180 deg to Position Two.

Then at Position Two, location A, face E, four holes are drilled 0.1015 in., and four holes drilled 0.199 in. At location B, face C, two holes are drilled 0.1405 in., and four holes drilled 0.113 in.

At the right hand head, location A, face A, seven holes are drilled 0.098 in., and the machine indexed 180 deg to loading position.



NATCO automatic high speed light sensitive driller

M-55—Production Polishing Machine

A fast machine—the four-eighty-four duplex polishing machine—for producing a quality finish on small cylindrical work, has been developed by the Production Machine Co. of Greenfield, Mass. Equipped with two polishing

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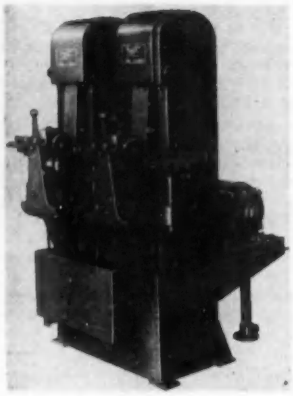
For additional information regarding any of these items, please use coupon on page 62



Production Machine Co. four-eighty-four polishing machine

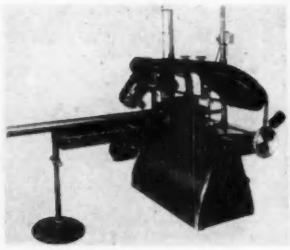
heads this machine employs abrasive, felt, leather or fabric belts.

Having a capacity up to 1½ in. diam the machine performs a two pass polishing operation on metal, wood, fibre, plastic, fibreglass and many other materials within its weight limitations. Only a single handling of material is required, and many parts may be fed to the machine automatically by means of hoppers or fixtures suitable for the individual application.

M-56—Metal Cutting Band Saw

W. F. Wells & Sons, Three Rivers, Mich., are offering the second in a series of metal cutting saws—the Model D—designed for larger cutting jobs, and for milling and planing operations, such as slotting, removing corners of die blocks, etc. Many hand operations have been eliminated. The machine raises and lowers hydraulically.

Capacity is 14 in. by 18 in., with maximum clearance under the saw blade of 20 in. The vise swivels 45 deg in either direction. Cutting speed is 60, 90 and 120 ft per min. All rotating parts operate on ball bearings. Prolonged blade life and correct drift are obtained by blade guides with single screw adjustment for rotating the blade. The stock stop automatically moves out and up at completion of the cut to eliminate binding of the stock on the blade. Hydraulic control gives smoother operation, it is stated. A special metered valve used for displacing oil at a selected pressure on the blade prolongs the life of the blade. When the cut is completed the machine stops at a selected height or it may be set for a repeat cycle. A rotating blade brush cleans chips from between the teeth as well as from the sides. The coolant system is removable for cleaning.



F. W. Wells 14 in. metal cutting band saw Model D

Machine Tool Builders Elect Officers, Stress Modernization in Plants

Richard E. LeBlond, president, the R. K. LeBlond Machine Tool Co., Cincinnati, O., is the new president of the National Machine Tool Builders' Association, following his election recently at its 49th annual meeting in Toronto, Canada. Frederick S. Blackall, Jr., president and treasurer, the Taft-Peirce Manufacturing Co., Woonsocket, R. I., and Swan E. Bergstrom, vice-president, the Cincinnati Milling Machine Co., Cincinnati, O., were elected first and second vice-presidents, respectively. Jerome A. Raternan, president, the Monarch Machine Tool Co., Sidney, O., was reelected treasurer. Tell Berna continues as general manager and Mrs. Frida F. Selbert was again named secretary. Three new directors were also elected. They are Mr. Bergstrom, Edward W. Miller, president, the Fellows Gear Shaper Co., Springfield, Vt. and Francis J. Trecker, president, Kearney & Trecker Corp., Milwaukee, Wisc. They will serve three year terms.

Frank Pensinger, chairman of the Advertising Committee, explained how this new committee came into existence and pointed out the many ways in which advertising men can help promote the objectives of the Association. Continuing, he said that it was decided to concentrate on one of the major problems of the Sales and Service Committee, namely, to help in showing industry how to adopt and use an enlightened and continuous equipment modernization policy. This was to be done coincident with the organization of a Machine Tool Advertising Council. Every company enjoying membership in the Association is entitled to representation on the Advertising Council. Meetings have already been held at Detroit, Cleveland, Rockford, Cincinnati, Boston, New Britain, and New York, by the Advertising Council, and others are being planned.

Mr. Pensinger emphasized the fact that some large manufacturers, International Business Machines and Ford Motor Co. of Canada, for example, have in operation a continuing equipment replacement program and stated that a big field of education lies in medium sized plants. (The replacement program of Ford Motor Co. of Canada was described in AUTOMOTIVE INDUSTRIES, July 15).

A year ago the machine tool industry was primarily concerned with sales in a peacetime economy, but today is even more concerned as to how demands made by the requirements of a war production program are to be met, according to David Ayr, retiring president of the Association. He said that much of the business received since Korea represents a payoff on sales campaigns of the last few years. The orders, for the most part, represent replacements which manufacturers should have made long ago but which, for various reasons, had been postponed.

The importance of sound modernization policy was stressed by Swan Bergstrom, chairman, Sales and Service Committee. He called attention to the need for a selling program directed toward the future and warned against any letdown in efforts to promote the need of replacing older equipment.

Study Defense Problems

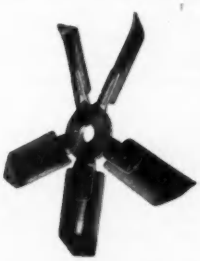
Headed by H. L. Tigges, vice-president, Baker Bros., the Joint Industry Mobilization Group of the Machine Tool Industry met in Toronto on Oct. 10th to discuss the problems of the industry

(*Turn to page 78, please*)

SCHWITZER-CUMMINS COMPANY

Specialists in COOLING FANS

FANS
FANS
FANS
FANS
FANS
FANS
FANS
FANS



Designing and manufacturing cooling fans, all types and sizes, has been an important part of our business for 31 years. We have produced untold millions of fans for all sorts of services, all over the world. Often we are the only source for fans for large automotive programs, always we are busy producing for a multitude of smaller users whose requirements range through the entire scale of types, sizes and materials and carry all the special features incident to fans. It is routine for us to be asked to develop and build a fan for some problem job of cooling, something that will improve performance or reduce costs, or both.

All this has created a skill and understanding about fans that can be invaluable to any manufacturer using them in his product. If you are in need of a specialist's assistance and a good source of supply, we will be glad to serve you through our engineering and manufacturing groups and the facilities of a fine research and fan testing laboratory.

Illustrated are three outstanding examples of an unusual fan design developed by us—all of the laid-back tip type, all with high capacity and very quiet—one 18″ in diameter, 3-blades, one 21″ diameter, 5-blades, one 26″ diameter, 6-blades. All these fans completely fulfill the objectives of the buyers and save them money. All are in large production. These illustrations present a small example of the diversification of our fan operations.

A thermostatically controlled fan, simplified and with many advantages for applications where a rate of cooling variable with the work is desirable, is a recent development of our own engineering.

COOLING FANS FOR OVER 31 YEARS

OTHER PRODUCTS

- OIL PUMPS
- WATER PUMPS
- SUPERCHARGERS
- VIBRATION DAMPERS
- AUTOMATIC SHAFT SEALS

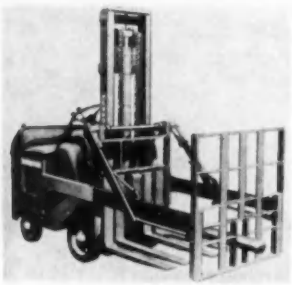
SCHWITZER-CUMMINS COMPANY
1125 MASSACHUSETTS AVENUE
INDIANAPOLIS 7, INDIANA, U.S.A.

NEW PRODUCTS

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 62

P-82—Coiled Wire Unloader

A coiled wire unloader—newest specialized materials handling development of Towmotor Corp., Cleveland, Ohio, combines a standard ram accessory and



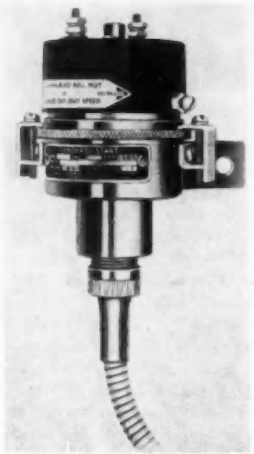
Towmotor Model LT-40 lift truck equipped with ram accessory and a hydraulic unloader accessory, for coiled wire handling

a standard hydraulic unloader accessory to produce a versatile, double-duty unit for the handling of coiled wire. The two accessories are furnished on a Model LT-40 Towmotor lift truck, together with a special set of fully tapered and polished forks. The forks and ram are used interchangeably. With the forks, a load of spools of wire is lifted directly on the forks from a take-it-or-leave-it pallet, and with the ram, a group of coils in vertical position is picked up by inserting the ram through the open center of the coils. In depositing the load, the unloader is used to push the coils off either the forks or the ram.

P-83—Overspeed Governor

Synchro-Start Products, Inc., Chicago, Ill., presents a new overspeed governor for safety shut-down of internal combustion engines and machinery. Adjustable to decrease or increase the shut-down speed while running, Model GFA is equipped with automatic re-set and Model GFM with manual re-set.

New features are sealed steel ball bearings with extra lubricant reservoir sufficient for life run, and a standard

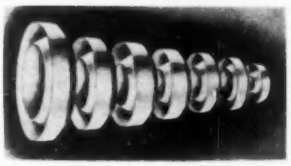


Synchro-Start overspeed governor on Models GFA and GFM

take-off for heavy duty tachometer drive for use with a flexible shaft.

The governor is of full metal construction, equipped with mounting bracket, five inches in height, and approximately 3 lbs shipping weight. Now being tooled for production, with deliveries to start in December, 1950. Models GFA and GFM augment the line of GP and GK overspeed governors for standard SAE drives.

P-84—Teflon Molded V-Type Packings



Crane frictionless, chemically-inert "V-Ring" packing.

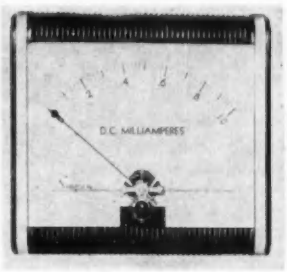
Opening new possibilities in hydraulic sealing, Crane Packing Co. of Chicago, Ill., has announced perfection of "V-Ring" Type packings molded from pure Teflon—newest development in the line of "Chemlon" (Teflon-fabricated) packings made by the Company.

These molded V-type packings combine the chemically inert and frictionless properties of Teflon with the resilience and toughness needed for proper sealing results. Cross-section design insures permanent sealing, even under varying pressures, at temperatures up to 450 F, the company states.

The low friction characteristics and the ability of these V-Rings to withstand higher temperatures and corrosive chemicals make them of value to the chemical field. They are also cited as important to valve manufacturers because of their frictionless characteristics.

P-85—Modernistic Panel Instruments

The Simpson Electric Co., Chicago, Ill., is making a line of modernistic panel instruments in three different sizes to suppply customers with a complete line of both conventional and mod-



Simpson line of modernistic panel instruments, Models 1029, 1027 and 1127

ernistic design. The models, of identical design, come in 4½, 3½ and 2½ in. sizes.

The large, easy to read scale provides greater readability under all light conditions. The etched face extends across the entire front of the meter and is protected with unbreakable plastic. Vertical chrome-plated strips are recessed into the plastic fluted cover. The panel instruments are sufficiently conservative in outline to enhance the appearance of either modern or conventional

Tapered-Twisted Teeth

FOR MAXIMUM LOCKING EFFICIENCY!

EXTERNAL

Shakeproof Lock Washers provide the vibration protection of tapered-twisted locking teeth at any fastening point.

INTERNAL

Each locking teeth actually bites into mating surfaces for positive resistance to loosening!

EXTERNAL–INTERNAL

Extra locking teeth help to span elongated holes and assure greater electrical contact efficiency.

COUNTERSUNK

Shakeproof Lock Washers assure positive vibration protection even with flatter oval head screws.

WHEN YOU ORDER SEMS, BE SURE TO SPECIFY SHAKEPROOF LOCK WASHERS!

SHAKEPROOF

T. M. REG. U. S. PAT. OFF.

LOCK WASHERS

a type and size for every locking need!

DISHED

Special arched shape provides extreme fastener resilience for shock resistance and vibration protection.

SEND FOR THIS FREE BOOKLET TODAY!

Check the vibration hazards that attack every assembled product and see how Shakeproof Lock Washers lock three ways to eliminate these hazards. They actually lock tighter as vibration increased.

DOMED

The "dome" design distributes fastener stress over a wide area when extra tension is required.

HAVE YOUR PRODUCT "FASTENING ANALYZED"

Let a Shakeproof engineer study your product to see if improved fastening methods can reduce your costs. Write for details, today!

SHAKEPROOF inc.

DIVISION OF ILLINOIS TOOL WORKS

2501 North Keeler Avenue, Chicago 39, Illinois

In Canada: Canada Illinois Tools, Ltd., Toronto, Ontario

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 62

equipment. The open scale layouts provide space for customer's name, trademark or use of color combinations.

P-86—Kit For Screw Thread Inserts

One of a series of new and compact kits brought out by the Heli-Coil Corp. of Long Island, N. Y., for installation of Heli-Coil screw thread inserts. Simplified kits are available and can be made up for industrial, aviation, automotive, and machine shop use. For maintenance, production work, and field service, they provide an assortment of inserts for screw threads from No. 6 to 1½ in. size in American National Coarse and Fine Series, as well as for spark plug and taper pipe thread sizes. The elaborate special kit shown, originally designed for military field use, contains a tap, an inserting tool, a tang break-off and retrieving tool, a staking tool, an extracting tool and a supply of inserts for 14 mm spark plugs

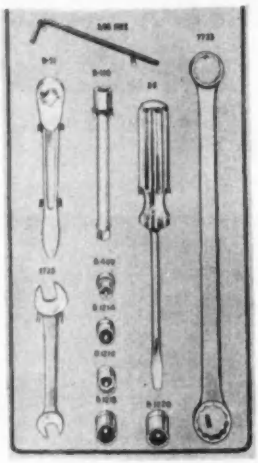
P-87—Radiator and Water Cleaner Device

Fram Corp. of Providence, Rhode Island, has recently introduced its new radiator and water cleaner for cars, trucks and buses. Impervious to anti-freeze and radiator chemicals, the device inhibits rust and corrosion, softens coolant water to stop scale deposits, and filters rust, scale and foreign particles from the coolant. It guards the cooling system against severe over-heating, frequent cause of scored pistons and cylinders, burned valves, cracked blocks and heads, etc.

A controlled amount of water flows continuously from the cooling system and enters the Fram radiator and water cleaning unit. Water contacts the chemicals for softening and inhibiting and passes through the filtering media where all solids are removed. Filtered, softened water containing a soluble inhibitor re-enters the cooling system and circulates throughout, with the result that the cooling water is free of particles, and cannot cause scale deposits, rust or corrosion.

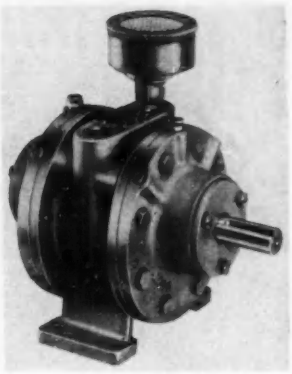
Fram radiator and water cleaner device

P-88—Tool Set for Automatic Transmissions



To facilitate oil-change work on automatic transmissions, J. H. Williams & Co., Buffalo, N. Y., has developed a set of service tools available in a metal case, Set ATS-1, or with a plywood panel, Set ATS-2, for wall mounting. The assortment includes all tools necessary for oil-change work on such transmissions as Hydra-Matic, Dyna-Flo, Power Glide, Ultramatic, Fluid Drive and Studebaker. Set ATS-2 is shown.

P-89—Rotary-Vane Air Motor



Gast rotary air motor

A new, larger No. 8 rotary-vane air motor now in production at Gast Mfg. Corp., Benton, Harbor, Mich., offers variable-speed drive with simple valve control, explosion-proof safety in hazardous locations, and proof against damage when slowed or stalled by overloads.

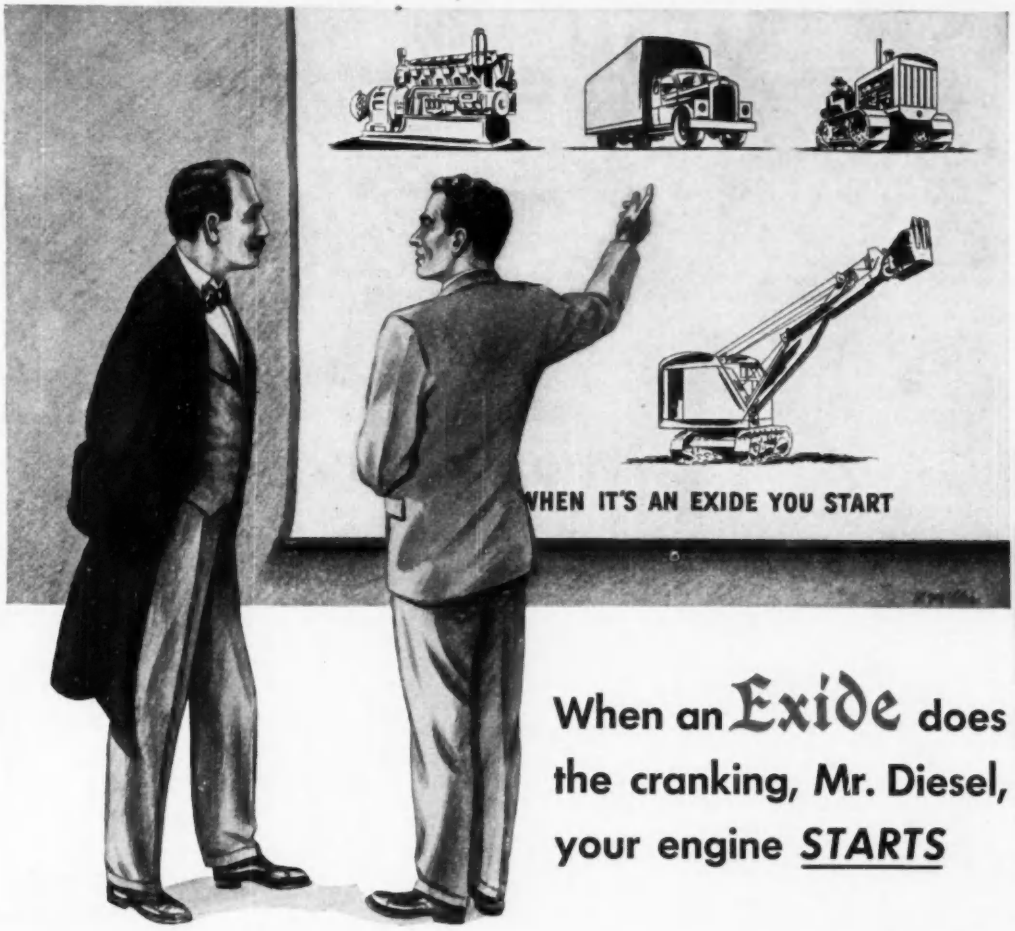
Operating range is from ½ hp at 500 rpm to 3 hp at 1500 rpm for the reversible type. Non-reversible models deliver up to 4 hp. Adaptable for air pressure from 30 to 80 psi, the motor uses from 20 to 100 cfm depending on rpm and load.

As it cannot burn out when slowed or stalled, it offers new possibilities for applications requiring frequent stop-and-go operation, according to the manufacturer. Light and compact for its power, this ½ to 4 hp motor weighs 25 lbs; measures 8 5/32 in. long, 5¼ in. wide and 6 7/32 in. high with base.

P-90—Silicone Rubber Parts

The Stalwart Rubber Co., Bedford, Ohio, is furnishing gaskets, sleeves, washers, channel, seals, tubing and other molded, extruded, punched and lathe or die-cut rubber parts in quantity fabricated from the new Silicone 161

Parts made of Stalwart Rubber Co.'s new Silicone 161



When an Exide does the cranking, Mr. Diesel, your engine *STARTS*

You can count on sure starting, because an Exide Battery is built specifically for the job . . . built to deliver the mighty surge of cranking power a Diesel engine needs.

Whether you're a manufacturer or operator of Diesel engines and Diesel-powered equipment, that means you can depend on your Exide Diesel Cranking Batteries for:

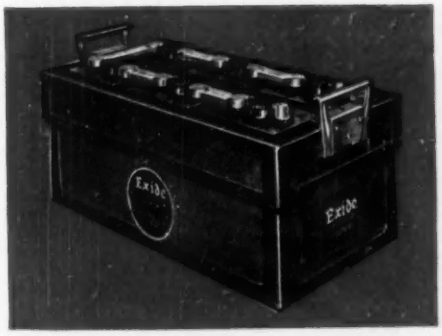
- high maintained voltage—a *quick breakaway* and *high cranking speeds.*

You also get:

- long life—low depreciation, less frequent replacements.
- low costs—operating, maintenance, repair.
- rugged construction, for heavy-duty service in all climates.

For maximum economy and dependability, use Exide Batteries for all your Diesel cranking—buses, trucks, trailer-tractors, off-the-highway equipment, ships, power plants, Diesel-electric locomotives.

TO HELP YOU GET TOP CRANKING performance, Exide's Engineering Staff, the largest in the industry, will be glad to help you solve any of your Diesel-cranking problems.



THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

"Exide" *Reg. Trade-mark U.S. Pat. Off.*

1888 . . . DEPENDABLE BATTERIES FOR 62 YEARS . . . 1950

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 62

rubber compound. This new 161 compound is said to be fabricated more quickly and easily, lowering the cost of production of parts made from it. Red in color, the new Silicone 161 eliminates possible soiling during end fabrication. While the dielectric strength of the new compound is only 170 volts/mil, it is stated to retain all the other qualities of Silicone rubbers in offering maximum resistance to extreme temperatures, weathering, chemicals, and oils.

Silicone 161 rubber parts have a tensile strength of from 470 to 520 lbs per sq in., elongation of 110 to 160 per cent, and a very high specific gravity of 2.1.

Rubber parts made of Silicone 161 feature a wide applicational value in installations where extreme temperatures are encountered, in industrial ovens, steam generators, jet aircraft engines, die-casting machines, etc. In addition, the new compound is recommended for use in systems handling hot or cold fluids, gasses, and vapors.

Silicone 161 will not become brittle and will not crack after long exposure to air, ultraviolet rays or ozone. Parts will not turn to carbon despite extreme heat, and they can be used to replace metal constructions which have been forced upon design engineers because of limited thermal stability of organic rubber, the company points out.

P-91—Self-Positioning Dial Groove Gage

For quality control inspection during production, the new self-positioning Nilco dial groove gage placed on the market by Nilssen Gage Co., Inc., Poughkeepsie, N. Y., accurately and easily measures internal groove diameters and recesses used for precision retaining rings of the Truarc type, ordinary snap rings, O-rings, oil and washer grooves, etc.

Nilco dial groove gage

Nose of the gage has 2 extensions. Upper extension has a gaging pin, set between 2 prongs of a one-piece plunger. The 2 prongs, having a 60 deg chamber and a flat edge slightly less than groove width, feature a center pin in the groove and position the axis of the pin through the exact center of bore. Lower extension—with fixed gaging insert—is pulled in by a trigger, when inserting the nose into a housing. Releasing the trigger locates the groove almost instantly. The dial indicator—in 0.0001, 0.00025, or 0.0005 mm calibrations—gives quick, accurate reading.

Each size gage can be set by a simple vernier within a wide range of diameters. Changing the setting does not change the spring tension on the gaging pin. Settings can be made with gage block combinations, micrometers, or master ring gages.

P-92 Elastic Upholstery Material

Elastic upholstery material, with a new high slip finish, developed by United States Rubber Co., New York, N. Y., for use in automobiles, buses, trucks and furniture is made of a new type vinyl plastic that stretches in every direction, tailors easily and stays permanently soft and pliable. The material combines a special elastic supporting fabric and an elastic plastic coating, developed by U. S. Rubber after five years of experimentation.

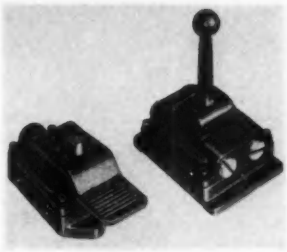
Called elastic Naugahyde, the product has been adopted by leading car manufacturers for upholstering of 1951 passenger cars and convertibles, and is sold in rolls 30 to 40 yds long and 47 in. wide. Colors are on a special order basis, although five are already in the stock line.

The stretchy, plastic upholstery is said to be practical for production line operation. Patterns can be multiple-cut with electric knives. Because of the stretchy construction, slightly smaller pattern can be used with resultant savings in material.

Elastic Naugahyde is easy to handle, needs no wetting, special tools, tape or cement for application. It does not bag or wrinkle

It is highly resistant to scuffing and tearing, can be washed with soap and water, and will not crack or flake. It is not harmed by oils, greases, gasolines or alkalis and is resistant to weather.

P-93—New Air Valves

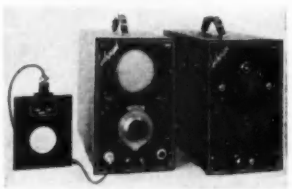


Ross 880 series valve

An air valve announced by the Ross Operating Valve Co., Detroit, Mich., is designed for a multitude of uses such as on jigs and fixtures. Chief feature is flexibility due to interchangeability of parts. It can be supplied with vertical handle, with a vertical handle with spring return, horizontal handle, horizontal handle with spring return, double treadle foot lever, or single treadle foot lever with spring return.

A separate base permits manifold mounting. Bases are available for bottom or side ports. A level seat is standard, but non-level is optional. A two or three position locking arrangement, or non-locking, or a combination can be supplied. The valve is available in 3-way or 4-way models, with ¼ in. and ⅜ in. pipe sizes.

P-94—High Speed Metal Sorter



Dice high-speed metal sorter, the Automatic Cyclograph

High speed, non-destructive quality control and sorting of metal parts of any size by their metallurgical characteristics is afforded by the new automatic "Cyclograph" put out by the J. W. Dice Co., Englewood, N. J.

Operating on magnetic principles, this instrument can rapidly sort by mixed analysis of the part, structure, hardness, case depth, brittleness or almost any metallurgical difference.

Testing speeds of 1 to 5 parts per second can be attained when parts are sent through the test coil on a belt conveyor or by other fast means.

The automatic Cyclograph provides both "single level" and "two level" sorting. The instrument can be used to reject both above and below an established acceptable range.

BORES OF *Any Length* MAY BE MICROHONED*

remove stock efficiently, generate accuracy

This drawing shows a hydraulic cylinder 30 in. in diameter and 33 ft. long and the tool used to MICROHONE it. This cylinder is held to a .001 in. tolerance for straight and round for its full length.

***MICROHONING = STOCK REMOVAL + GEOMETRY + SIZE CONTROL + SURFACE FINISH**

MICROHONING* is the only production, stock-removing process that can be used on any length bore without loss of accuracy. Bores from .006 in. to 40 ft. in length are being MICROHONED with MICROMATIC equipment.

MICROHONED accuracy is not dependent on rigid alignment of the quill. Cutting pressures are balanced and act radially from the center of the tool. The large contact area stabilizes the tool in the bore. Tool construction isolates the cutting edges from machine vibration, and permits tool to align itself. The long plane-like abrasive levels off surface waviness and generates a round, straight bore. Any amount of stock can be removed, and size held to close tolerances. Surface finish may be held to any degree of uniform roughness, and duplicated in every bore.

*Registered U.S. Patent Office

Write for Cross Hatch on MICROHONING Long Bores

Micromatic Hone Corporation
8100 SCHOOLCRAFT AVENUE
DETROIT 4, MICHIGAN

District Field Offices: 1323 So. Santa Fe., Los Angeles 21, California • 614 Empire Building, 206 So. Main St., Rockford, Illinois
55 George St., Brantford, Ontario, Canada • Micromold Manufacturing Div., Boston Post Road, Guilford, Connecticut

Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

L-98 Stampings and Dies

Kickhaefer Mfg. Co.—A new industrial book of stampings and dies is available. It is, first of all, a book of engineering drawings and specifications for metal stampings. One section of the book is devoted to information on how tubing and wiring clamps, brackets, angles, etc., can be made to individual specifications without die charges.

L-99 Speed Reducers

The Cleveland Worm & Gear Co.—Cleveland Type AT and RT worm gear speed reducers are described in Bulletin 130. Horsepower rating tables, together with construction details, are included.

L-100 Lathes

The Monarch Machine Tool Co.—The new Series 60 engine and toolmaker's lathes are described and illustrated in a new, 44-page catalog, No. 1113. The catalog reviews the major design engineering features and performance improvements of the new series. Other pages are devoted to describing and illustrating the Monarch lathe accessories and attachments. A pictorial summary of quality control techniques used in the company's lathe manufacture, is also presented.

L-101 Adhesives, Sealers

Minnesota Mining & Manufacturing Co.—Industrial adhesives, coatings and sealers are tabulated in a new illustrated catalog. Three tables of properties cover: adhesives for bonding metal, rubber, glass, plastics, fabrics, wood, etc.; sealers used in manufacturing automobile bodies, etc., and coatings for protecting metal against corrosion, and abrasion. A separate section covers the 15 "Coro-card" protective systems.

L-102 Materials Handling

Barrett-Cravens Co.—Bulletin P-476 entitled "Design for Pallets" contains practical data on pallet design, illustrated with working drawings. The 16-page bulletin presents the Barrett pallet systems, employing hand and electrically operated lift trucks for single or double faced pallets.

L-103 Tungsten Carbide Tools

Charles L. Jarvis Co.—A 12-page, 2-color folder, fully describing solid tungsten carbide rotary files, reamers, etc., is available. Diameter tables are included in the folder.

L-104 Exhauster Fan

Robinson Ventilating Co.—A new bulletin is available containing capacity tables for the company's new type AE Exhauster. Construction data, performance data and tables are included.

L-105 Automatic Lathe

Sundstrand Machine Tool Co.—A circular is available which describes and illustrates the Sundstrand Model 8A Automatic Lathe. Feature details, specifications and a table giving dimensions and shipping weights, are included in the circular.

(Turn to page 92, please)

TIME SAVER COUPON

***THIS TIME SAVER COUPON** is for your convenience in obtaining, **WITHOUT OBLIGATION**, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.*

Readers' Service Department,
Automotive Industries,
Chestnut & 56th Sts., Philadelphia 39, Pa.

Please send me: **These FREE Publications** (Use letter and designating number of each item desired)	*Please send me more information on:* **New Production and Plant Equipment** (Use letter and designating number of each item desired)	*Please send me more information on:* **New Products** (Use letter and designating number of each item desired)
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Your Name ..... Your Title .....

Your Company Connection or Business .....

Address ..... (Street & No.) (City) (Zone) (State)

Multiply Production × Subtract Man-Hours + Add Profit

with BUNELL Jigs and Fixtures

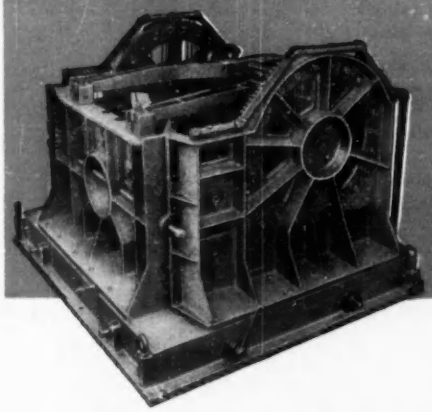
AUTOMOBILE FRAME CHECKING FIXTURE. Checks frame and drills two final holes. Can be adapted for straightening.

BUNELL FIXTURES REDUCE HANDLING TIME, SPEED PRODUCTION, INCREASE PROFITS

If your product is squeezed between high production cost and lower selling price . . . . Bunell Jigs and Fixtures can help you solve your problem. These special fixtures are designed for fast, easy handling of parts for greater production efficiency and lower cost.

Bunell has had 29 years of experience in building jigs and fixtures of *all* sizes—for every conceivable purpose. Our modern, complete plant facilities are especially suited for extremely accurate work on large size fixtures. You can depend on Bunell for sturdy, well-built fixtures that do the job *right*.

Our specialized experience and know-how are at your service. Consultation with our engineers on your problem is invited. Write today for full information.



DRILLING FIXTURE. This unusual fixture supplies coolant under pressure to the cutting tool near the bushing.

PRECISION INDEX MILLING FIXTURE. Mills laminations for variable speed chain drives to extremely close tolerances. Indexes within a fraction of a second of a degree.

WRITE FOR CATALOG which shows a wide variety of Bunell Jigs and Fixtures.

THE BUNELL MACHINE & TOOL CO. CLEVELAND O.

BUNELL MACHINE AND TOOL CO.

1601 EAST 23rd STREET • CLEVELAND 14, OHIO

Since 1920, Designers and Builders of Special Tools, Dies, Jigs, Fixtures and Special Machines

Sound Engineering for Quieter Automobiles

(*Continued from page* 52)

Originally designed for voice and instrumental recording, it is a high fidelity instrument and, according to Ford engineers, has an extremely wide frequency range from the lowest to the highest audible frequencies.

Convenient size and light weight make for easy portability of the equipment so that it is readily applicable for studies in a car on the road or in the laboratory. When installed in a test car, the magnetic tape recorder can be used for investigating the complexity of noises on all manner of road surfaces and all road speeds. It has been employed for investigating body rumble, rear axle noise, engine noise, wind noise, and exhaust system tuning. The instrument also has been used in studying spring squeaks.

Major advantage of portable recording tape equipment of this character is the ability to record specific sound tracks together with vocal observations and comments. Not only does this provide a permanent library record for future reference but it is a simple matter to dub in comparative sound tracks on other cars or with other units in the same car and observe their relative behavior on the same tape. It makes it simple, too, to compare an acceptable noise pattern, based upon personal observation on the road with laboratory experiments out of the car.

When used in conjunction with an octave filter—which is standard practice at Ford—it becomes feasible to isolate specific noises in conjunction with proper location of the microphone and thus analyze the noise generated by the axle or engine or body to the exclusion of other sounds.

To the specialist in the various running gear elements the magnetic recorder has proved invaluable in investigating noises and leading to their correction by modification in design or production procedures. This leads to the important observation that modern research seeks to correct noise makers at their source rather than to resort to palliatives in the form of thicker insulating blankets.

Recent investigations have shown that the dash requires better acoustical treatment rather than thermal insulation. The floor, on the other hand, demands thermal insulation to a greater degree than it does acoustic insulation. The treatment in each case is entirely different to suit the purpose.

One of the latest developments here is an apparatus for measuring the sound intensity drop across a piece of insulating material. The material to be tested is mounted on a board which is fastened over the end of a chamber containing a loud speaker. One microphone is located inside the space between the loud speaker and the test piece, the other microphone is mounted outside. The difference in noise level between the two microphones is considered a measure of the sound transmission quality of the material under test.

Another piece of equipment conceived and built in this department is designed to test the relative effectiveness of sound deadeners such as sprayed undercoatings. The apparatus consists of a cabinet housing an electronic oscillator and automatic controls, mounted on a heavy table, with connection to a magnetic vibrator. The test plate is connected through a vibration pick-up to a high speed time recording device which records the actual decay period and shuts off when vibration has stopped.

For this test, each sample of mastic deadener is sprayed onto a standard steel plate in the specified thickness. The plate is then mounted over the vibrator on the table and observations are made of the vibration characteristics and decay period. Ultimately, samples of mastic from all sources submitted to the laboratories are evaluated on the basis of decay period and purchasing specifications written on that basis.

Another recent use of the magnetic tape recorder, testifying to its versatility, is in connection with a new radio service program. Ford dealers are being trained to service radios in their own shops and a suitable training program is being prepared on a slide film presentation. For this purpose, the laboratory has prepared tape records of specific noises that affect radio reception in the car. For example, the sound track picks out noises due to secondary and primary ignition circuits, generator noise, etc.

These sample sound tracks are dubbed into the sound track for the slide film with the necessary explanations. The budding mechanics are shown how to distinguish the variety of noise makers out of the conglomeration of noise in an offending radio set. Armed with such practical information they are ready to do the right kind of trouble shooting.

These few examples have been selected at random to indicate the scope of scientific investigation aimed at the solution of practical engineering and production problems in the Ford organization. It is a significant fact, based upon the experience of these investigators, that noise level alone is no criterion of noise tolerance on the part of the car owner. It is true that noise level readings, if properly evaluated, can serve as a guide to improvement in car design. But it seems apparent that something more than the sense of hearing must be satisfied if a given car is to be made outstanding.

Psychologically, all of the senses play some role in this picture. Sometimes the appearance and comfort of a luxurious car interior will have the effect of masking a slightly high noise level, permitting the occupants to feel perfectly comfortable so long as the noise is tolerant in character. The problem then is not so simple as it appears. It is complicated by many variables mitigated by psychological factors in some cases and aggravated in others.

Automatic Devices Reduce Costs

(*Continued from page* 33)

max. This is done with an optical comparator, calibrated by the Profilometer.

3. Check length.
4. Check out-of-round.
5. Check taper—checked by diameter at each end simultaneously.
6. Grading for OD. Here the gage grades in three sizes, in steps of 0.0001 in. For this purpose the machine is fitted with a five-chute slide at the end, the gaging head being arranged to operate a guide which permits the pin to drop into the proper chute. Rejects drop into the reject chutes at the side.

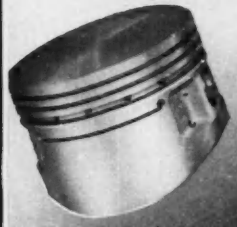
Parts are moved from one station to the next by a shuttle mechanism which includes a guide rail lined with sapphire to prevent marring the surface.

The Merz machines are tended by operators to keep the feeding chute filled, to assemble rejected parts in suitable containers, and to place the accepted pins into proper bins according to grade. The end result is increased productivity with less operator attention, coupled with an impressive improvement in overall quality.

Another example of equal effectiveness is found in the installation of a battery of Sheffield Multi-Chek machines for the inspection of pistons. Each of these machines with its operator replaces eight inspectors with the original method of manual gaging. Each machine is capable of inspecting 800 pistons per hour.

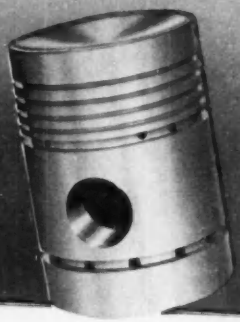
The Sheffield machine is fully automatic, even in presenting the work to the gaging head, the function of the operator being to load the automatic conveyor, unload, and mark the grade. Simultaneous readings are taken of the piston pin bore—which is air-gaged and stamped to indicate size classification; the ring groove widths; and skirt diameter at the major axis of the ellipse. Latest practice is to grade pistons in eight different sizes at the skirt diameter, in steps of 0.0003 in.

(*Turn to page* 66, *please*)



Air Craft

Nelson Auto-Thermic



Diesel

Trans Slot

U-Slot

Heavy Duty

Wing Insert

Two Cycle

Steel Truss

Turbulator head

T-Slot

Trunk Type

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The machine gives the grade automatically on a dial gage at the side, permitting the operator to note the grade and mark it on the piston head. Pistons are rejected by the machine for lack of conformity at any of the 12 gaging points. In such cases the machine shows a tell-tale red light, indicates the faulty dimension, and refuses to mark the OK grade on the piston head.

It is of interest that when this machine was first installed, to replace 100 per cent manual inspection, rejections were found to be greater than the percentage uncovered by manual inspection. This immediately projected an investigation of the entire process from start to finish, leading to corrective measures which have improved quality and reduced cost materially.

Valve seat inserts for Ford engines have been inspected automatically for many years by special mechanical machines, designed and built by Ford. In keeping with the new quality control program these machines are being improved and modified by the application of special Merz electronic equipment.

As illustrated, the Merz attachment is made at the gaging head of the machine. The important criteria for acceptance of valve seat inserts are: (1) tolerance on the OD, held to plus or minus 0.00025 in., (2) tolerance on the width or thickness, held to plus or minus 0.001 in., and (3) soundness—freedom from cracks. The latter aspect is accurately checked by having the ring drop on an anvil which is placed in the proper location to permit the ring to bounce into a hopper. If a ring is not basically sound, it cannot bounce high enough to reach the hopper. Instead it drops into a reject bin.

Looking at the end of the machine, one will find a cluster of five chutes. As in the case of the Merz piston pin checker, the gaging station electronically operates a guide bar which guides rings into the proper chutes. Actually only the center chute takes acceptable rings and these drop onto the anvil for soundness checking. The other four chutes handle respectively — oversize OD, oversize thickness, undersize OD, and undersize thickness. In all there are five causes for rejection, the fifth one being accepted rings failing to pass the "bounce test" for soundness.

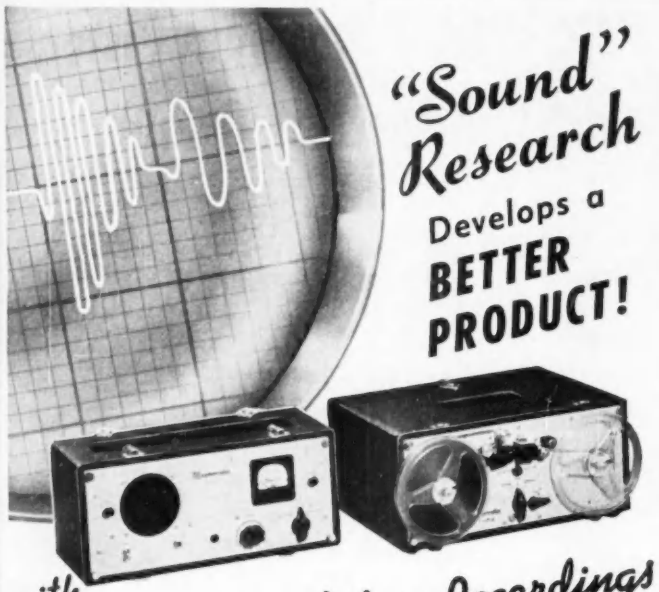
The machine is capable of inspecting about 3600 pieces per hour, productivity being limited only by the efficiency of magazine feed.

As mentioned earlier, quality control is being extended to all important operations. An example of entirely different character is found in the testing of water-tightness of cylinder blocks. Conventional procedure is to use a water test or a combination of water and air pressure to detect fine leaks. Ford has in operation a unique piece of equipment for testing exclusively with air pressure.

The test fixture illustrated here is completely automatic in operation. Blocks feed in on the conveyor and are picked up by a transfer bar for loading into the fixture. When the operator presses the start button, the machine automatically clamps the block, applies the sealing heads at all points, then applies air pressure. When an air pressure of 60 psi has been established, the air valve closes to permit air pressure to act for a measured interval of time. Even a minute leak—as small as a fine perforation—will be detected. This is indicated by the pressure gage and, in addition, the machine turns on a telltale red light. No further action is taken by the machine until the operator restarts it to unload the defective block. The location of the leak is later explored in a water test machine to determine the feasibility of salvage.

The control equipment for this air test fixture is known commercially as the Nullmatic, made by Moore Products Co. of Philadelphia.

It may be noted that additional electronic equipment is already in the process of building and should be in operation within the next few months. One of the largest and most dramatic items to be described in a later article is an automatic machine for gaging V-8 cylinder bores simultaneously, sizing in eight different grades, and automatically stamping the grade on each bore.



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De Soto's Eight Miles of Conveyors

(*Continued from page 48*)

line, carrying doors and lids. The conveyor dips to near floor level for a short stretch directly over a structural rail mounted on the floor. This rail is lined with a protective rubber bumper and so arranged as to support the bottom edge of doors. While traversing this rail doors are fitted with rubber seals.

The conveyor then rises, loops over the body line, and again dips to floor level on the other side, permitting operators to remove doors and lids without reaching.

At the end of the metal finishing line bodies are detached from their dollies and hooked onto a special trunnion type cradle suspended from a heavy monorail conveyor. The cradle is designed to permit the body to be turned in any position to facilitate painting operations. At this point bodies are held on a storage conveyor in readiness for scheduling through the paint shop.

As mentioned earlier, paint shop operations and equipment will be described more completely in a subsequent article. For the present let us consider that bodies have completed the paint schedule and are ready for the trim line. This brings us to the marshalling station (Grand Central Station as the operators call it). Overhead will be found a maze of conveyor switching junctions all coordinated by electronic control at the central control station. Essentially this permits bodies to be switched out of the last drying oven either directly to the trim line or for repair or two-tone treatment.

Another function is to move a load of bodies out of the drying oven over to a storage conveyor at the side of the booth at the end of the shift. When work is resumed the bodies on the storage conveyor are returned to the oven.

Bodies routed directly to the trim line move on the monorail to a point near the end of the trim line. At this point the movement of the monorail conveyor is accurately synchronized with the speed of the floor conveyor which carries the body dolly. Through electronic control, synchronization is so perfect that the body suspended on the monorail meets the dolly in exactly the position for accurate mating. The monorail by this time has dropped to a low level to meet the dolly and at the proper time the operators release the cradle hooks at both ends.

The trim line is an extensive operation of course. One of its interesting features is the installation of trolley duct power lines on both sides of the conveyor to serve the high cycle tools.

Following trim the bodies are ready for delivery to De Soto main for the final assembly line. The conveyor at the terminal end of the trim line is arranged to come out right at the loading dock. Here the bodies are detached from the dolly and lifted off the conveyor by means of an overhead cab which carries them on to the special body truck. Each truck carries eight bodies.

It may be noted that the terminal of the trim line conveyor, mentioned above, curves 180 deg at this point to pick up the start of the trim line. It is here that it meets the bodies on the monorail conveyor from the paint shop. And it is at this point that the movement of the dolly on the floor conveyor is so closely synchronized with the movement of the body on the monorail as described above.

One of the most noteworthy features of the De Soto body operation is the in-

(*Turn to page 70, please*)

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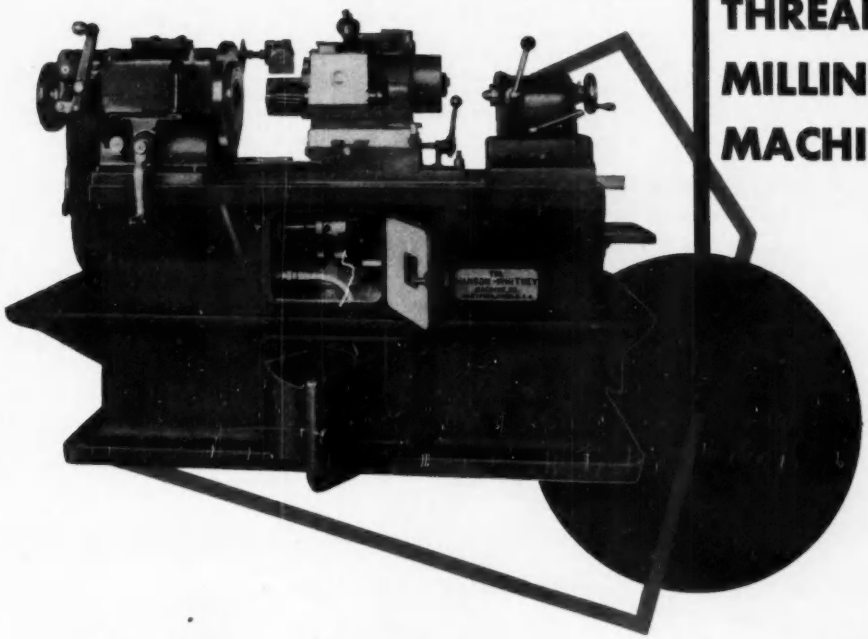

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stallation of a water test booth running some 106 ft through which all bodies must pass before acceptance. Here the bodies are subjected to a succession of water sprays directed at all points, particularly at major sealing areas. A total of some 84 nozzles is used in this booth, discharging about 420 gpm, with a pressure of 40 lb.

Scheduling is an interesting feature of this operation. As illustrated, De Soto uses teletypewriter instructions to a number of key stations primarily to indicate the order in which bodies are to be progressed through paint and trim. However, the key to scheduling and specifications is the metal tag which is punched on an addressing machine. This tag, firmly fastened to the body as a permanent record, gives the body style, paint, and trim specifications. This tag also serves to provide the Teletype instructions.

The attached table gives in detail the major conveyor systems in the plant. It may be noted that body-in-white features 8128 ft of conveyor; the paint department, 20,980 ft of conveyors; and trim, 12,915 ft. The total footage of conveyor systems of all types adds up to 42,053 ft, practically eight miles!

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Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

Despite declines in some major indicators, general business activity continues at a level substantially above that of a year ago. Decreases are reported in department store sales, bituminous coal production, construction, railway freight loadings, and crude oil production, while electric power output advanced to a new record level. For the week ended Sept. 30 the *New York Times* index of activity stands at 162.9, as compared with 161.9 in the preceding week and 134.8 a year ago.

The dollar value of department store sales in the week ended Sept. 30, as reported by the Federal Reserve Board, was equal to 320 per cent of the 1935-39 average, as compared with 322 in the week before. At this level, the value of sales was six per cent more than in the comparable week of last year. The total reported since the beginning of the year was five per cent more than the corresponding sum in 1949.

Production of bituminous coal and lignite in the week ended Oct. 7 is estimated at 11,415,000 net tons, 10,000 less than the output in the week before, but 9,273,000 above the comparable amount last year.

Civil engineering construction volume reported for the five-day week ended Oct. 12, according to *Engineering News-Record*, was $156.6 million, as compared with $287.9 million in the week preceding. The total recorded since the beginning of the year, at $9.4 billion, is 47 per cent more than that in the corresponding period of 1949.

Railway freight loadings during the week ended Oct. 7 totaled 863,676 cars, 1.9 per cent less than the figure for the week before, but 50.4 per cent above the comparable number a year ago.

Crude oil output in the week ended Oct. 8 averaged 5,871,000 barrels daily, 31,550 less than in the preceding week, but 856,200 more than production in the corresponding period of 1949.

Production of electric power established a new record in the seven-day period ended Oct. 7 for the second successive week. At 6514 million kilowatt-hours, total output was 19.5 per cent above the amount a year earlier, as compared with an advance of 17.8 per cent shown in the previous week.

The wholesale price index of the Bureau of Labor Statistics during the week ended Oct. 3, at 168.9 per cent of the 1926 average, was 0.3 per cent less than in the preceding week, but 10.9 per cent above the comparable figure for 1949.

Member-bank reserve balances decreased $73 million during the week ended Oct. 4. Underlying changes thus reflected include decreases of $296 million in Treasury deposits with Reserve banks and $103 million in Reserve-bank credit and increases of $149 million in non-member deposits and other Federal Reserve accounts and $128 million in money in circulation. An increase of $8 million in the monetary gold stock was also reported.

Total loans and investments of reporting member banks decreased $106 million during the week ended Oct. 4. An advance of $200 million in commercial, industrial, and agricultural loans was recorded. Total business loans, at $15,925 million, were $2,500 million more than the comparable sum a year ago.

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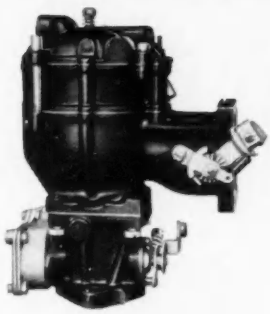

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AVIATION CORPORATION

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British Commercial Motor Show

(*Continued from page 36*)

The new Meadows engine is a six developing 130 hp at 1900 rpm, torque being 420 lb-ft at 1000 rpm and weight 1800 lb. Cylinders have dry type, centrifugally cast liners. In addition to this horizontal six, Meadows has produced a small four of 330 cu in., with a maximum hp of 80 at 2200 rpm and maximum torque of 230 lb-ft at 1200 rpm. This is a square engine of 4.7 in. bore. The helical timing gear is located at the rear of the engine.

There were no fully automatic transmissions in the show. The Hobbs adopted by Dennis is semi-automatic. The fluid flywheel, in conjunction with the Wilson type pre-selective transmission, with either full manual or assisted shift, is favored for bus service and is used by Daimler, as well as A.E.C. and its associate companies The Self-Changing Gear Co., which operates under the Wilson patents, has an automatic gear control which up to the present has been used only on rail cars, although applicable to road vehicles. It can be super-imposed on any of the company's transmissions of the non-preselective type. Its nerve center is a governor switch unit which takes into account the speed of the gearbox input shaft and the engine fuel injector, and directs gear changing in accordance with a predetermined pattern based on these two variables. This control can be overruled by the driver and can become fully manual through a master control switch, or it can be placed on one of the lower combinations, when the automatic mechanism would change down but could not go above the one selected.

First vehicle application of the Rover lightweight eight cyl 250 hp Diesel, described in AUTOMOTIVE INDUSTRIES, April 1, 1950, was by the Thornycroft Co. in its Mighty Antar gross weight 100 ton tractor designed for pipe line maintenance in Arabia. The rear bogie, produced by the Kirkstall Forge Co., provides tandem drive with double reduction in each axle, the primary reduction being by worm gearing and the secondary by two epicyclic trains, one for each driving shaft, these being compounded to provide a normal differential action. The main transmission housing is of the four speed constant mesh type, while the auxiliary gearbox is three speeds constant mesh type. The heavy duty, cam and double roller steering is hydraulically assisted. Tires are 14.00-24 in., 20 ply. Unladen weight is 15½ tons. Permissible load on the front axle is nine tons and on the rear bogie 36 tons.

Vauxhall (General Motors controlled), introduced a new series of Bedford commercials, the outstanding feature being a truck weighing just under three tons, carrying a seven-ton payload. This low unloaded weight lifts it out of the 20 mph class and makes it possible to legally run it at 30 mph on British roads. Used as an articulated semi-trailer, the payload is 10 tons. All other road vehicles of this load capacity are held down to 20 mph maximum. The engine is a 300 cu in. valve-in-head six of 110 hp, developing its maximum torque of 234 lb-ft at only 1200 rpm. It has dry cylinder liners, chromium plated top rings, a seven-bearing induction hardened crankshaft, silichrome XB steel exhaust valve seats, and pressure cooling. The Bedfords have hypoid rear axle, synchromesh gears, an optional

(*Turn to page 74, please*)

THE *Balanced* SOLVENT...
FOR ALL JOBS
BLACOSOLV
FOR ALL METALS OR COMBINATION OF METALS
ONE PRICE
ONE SOLVENT IS ALL YOU NEED
Blakeslee SOLVENT VAPOR DEGREASERS are more economical more efficient—USE LESS SOLVENT
NIAGARA Metal Parts Washers for use with cleaning compounds on either batch or production jobs.
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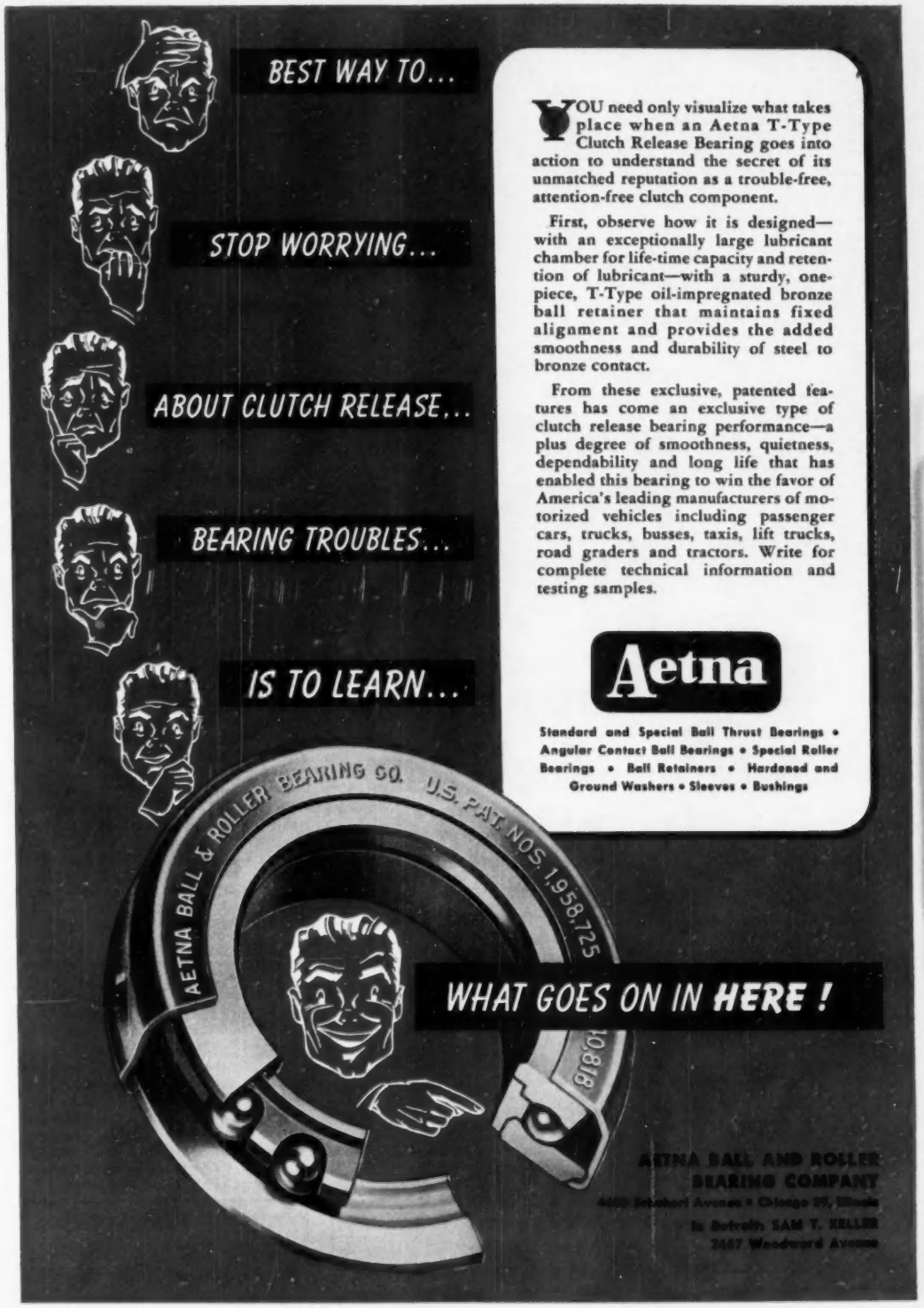
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Eaton two-speed axle and hydraulic-mechanical brakes.

Morris has increased the size of the six cylinder Saurer-licensed Diesel engine by carrying the bore from 3.34 to 3.42 in. and has added a new overhead valve six cyl gasoline engine of 256 cu in., which is used on both a two-three ton truck and a coach chassis. The Austin line has undergone little change.

Among the vehicles produced specially for foreign markets was the E.R.F. four-axle truck, with Gardner 112 hp six cyl Diesel and a five-speed transmission plus an auxiliary reduction gear. This model is intended specially for the Australian market. Atkinson had a 12-ton six-wheel truck with Gardner 512 cu in. engine, built for the South African market.

The biggest tractor in the show was the Scammell Pioneer model six wheeler, with drive to all wheels, and powered by a Meadows 130 hp Diesel. Primarily a military vehicle, it has an application for colonial and forestry work.

Leyland had on view one of the underfloor single deck buses as prepared for Havana, where street cars are being scrapped. Leyland claims to have the first pressurized luxury coach, with a ventilating system which gives a complete change of air every 2½ minutes. As the inside air is at a higher pressure than the air outside, the body is draft and dust-proof. Four high-speed electric fans, two thermostatically controlled, are incorporated in the heating and ventilating system which forces 550 cu ft of air into the coach every minute. Two entirely independent ventilating systems are used, one drawing air from two intakes above the windshield and the other being composed of two combined heater and ventilator units below floor level and just behind the front wheels.

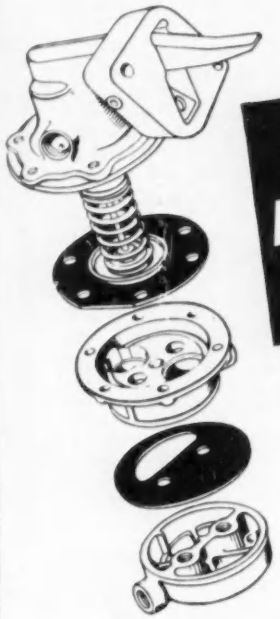
Some attention is now being paid by English coach builders to conveniences for long-distance travel, such as a refreshment bar, toilet, etc. These were common on Continental long-distance coaches but were not so necessary for the shorter stages on English routes.

The use of light alloys is extending. The Birmingham & Midland Motor Omnibus Co. displayed a unit frame-body, entirely of Birma-bright light alloy, with a saving of one-ton in weight on a 44-passenger single decker. This has an under-floor engine. Bonallack showed a series of truck, van and container bodies built throughout of aluminum alloy, the frames being of heat treated extrued aluminum alloy sections, riveted panels of aluminum, and the flooring of Dekaloy. The Duramin Engineering Co. also had a big variety of platform, van and truck bodies built throughout of aluminum alloy.

Jensen Motors displayed an aluminum alloy frame in a unit frame-body construction, the weight being just under three tons and the useful load up to six tons. A furniture removal van with a capacity of 1632 cu ft weighed 7728 lb, while the weight of a 40-passenger single deck bus was four tons. In this construction the floor is of corrugated light alloy sheeting with flush fitting wood inserts, and the body framework of steel tubing, with aluminum paneling wrapped around the tubes and riveted.

Dyson & Co. showed an all light-alloy trailer, standard light alloy sections being used throughout with the exception of the side rails for which a special extrued duralumin section had been made. A semi-trailer on these lines has a load capacity of 10 tons.

The international aspect of the show was not strong. France was represented by three makers—Renault, Panhard and Latil, while the American concerns were Dodge (British construction), Reo, and Studebaker. Ford, of course, is classed with the Britishers.



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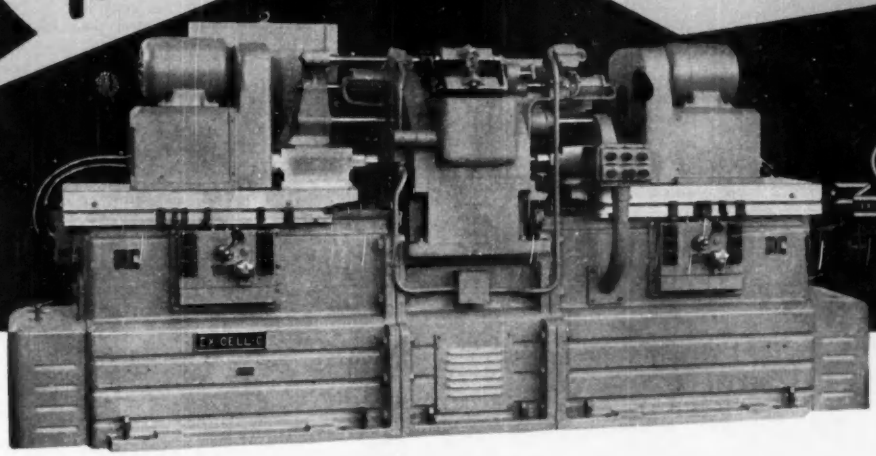

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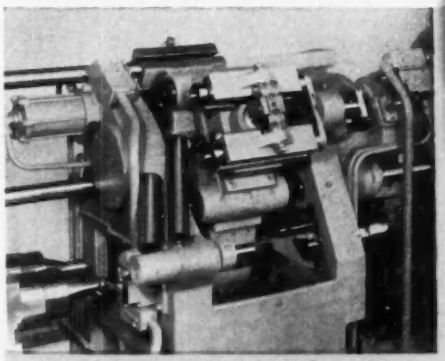

View of the three-station indexing fixture. Parts are loaded in upper station, machined in lower station, automatically unclamped and ejected from rear station.

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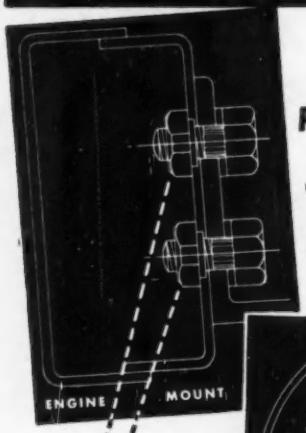

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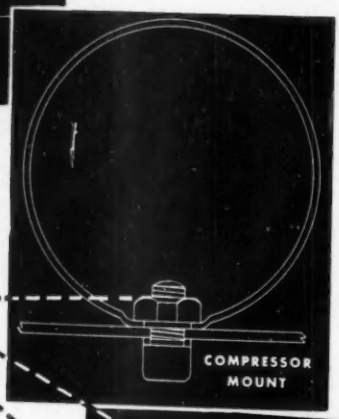

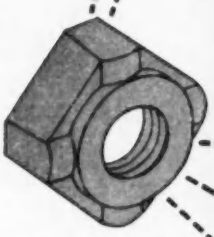

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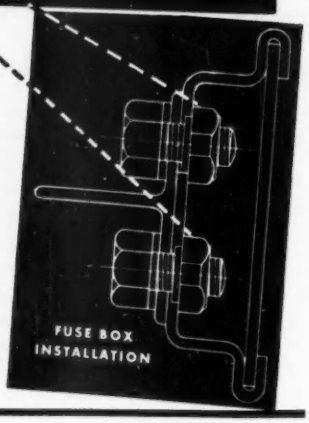

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Air and Vacuum POWER BRAKES

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Mercury 1951

(*Continued from page* 49)

110 bhp through the refinements outlined here.

One of the entirely new features of the engine is the introduction of a larger separable cast iron bell housing for both standard and automatic transmissions, adding considerably to structural rigidity. The clutch remains the same but the standard synchromesh transmission is completely new. It has a different case and new gearing featuring what is termed a balanced tooth design. Although gear ratios are unchanged, gear teeth are of coarser pitch and the gear box in general is said to have better than double the life of the former unit.

For 1951 Mercury offers the Merc-O-Matic drive as optional; the conventional three-speed synchromesh transmission as standard; and overdrive optional. The axle remains the same except for a new gear and pinion set having a larger number of teeth to improve quietness. The setup of axle gear ratios is as follows:

Standard transmission	3.91 to 1
Automatic drive	3.31 to 1
Overdrive	4.27 to 1

Incident to the change in throttle linkage required for automatic drive, the linkage has been changed and refined for all models.

It is of interest too that the rear engine mount, i.e., the mount at the rear of the transmission, has been changed, and now is of the same design as in Ford cars. At the same time the frame cross member under the transmission has been made removable to facilitate servicing of transmission.

It will be recalled that the Merc-O-Matic drive is air-cooled, taking in air through a scoop on the left hand side of the bell housing and exhausting on the opposite side. At the same time the radiator core with automatic drive is of larger capacity to afford better cooling of the engine. The fan too is larger, has four curved-tip blades arranged asymmetrically.

Other changed mechanical details include a revision of the tail pipe to clear the new bumper and revision of the filler neck incident to the new rear fender design. Another significant change is that sedan rear springs now will be fitted on coupe models as well, in keeping with the current practice of heavier loading of the latter models.

On automatic drive models the brake pedal is considerably wider, facilitating left foot operation if desired.

Interior treatment includes a new steering wheel and instrument panel knobs of unique design. The ventilating system has been improved by providing individual controls for the ducts on each side.

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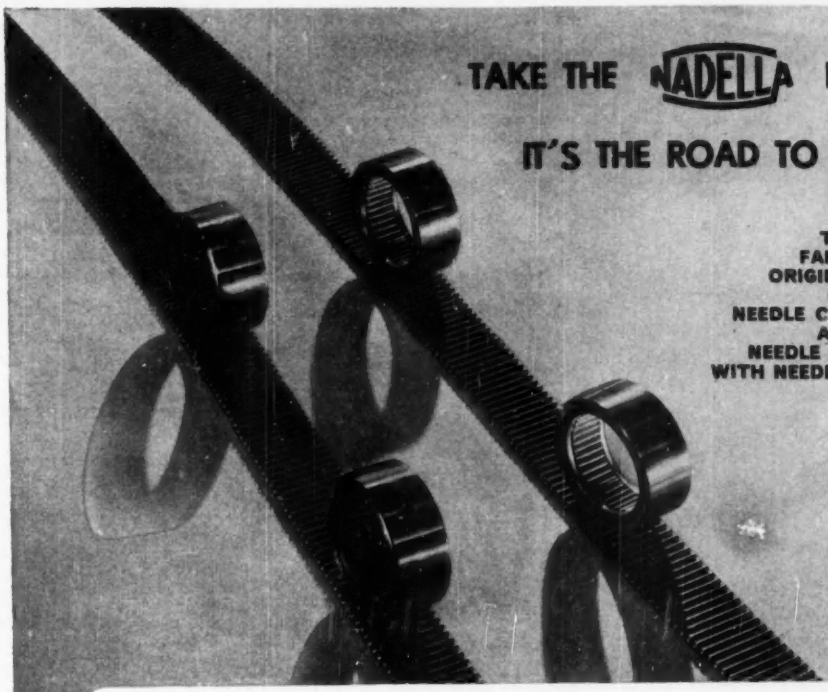
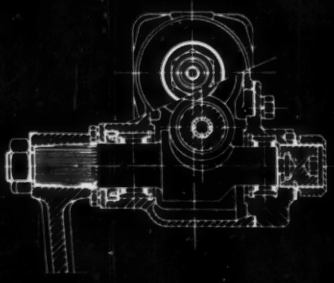


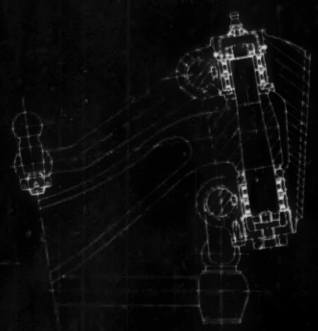
loose needles

needle cartridges

complete bearings



Steering gear



King pin (Front axle)

133 à 137 BOULd NATIONAL

NADELLA

RUEIL-MALMAISON (S.O.) FRANCE

MEN *in the* NEWS

(*Continued from page* 25)

of the board of the Racine firm. **H. H. Bloom** is President and **C. P. Milne**, First Vice-President.

American Hammered Piston Rings—The appointment of **A. H. Engstrom** as acting engineering manager has been announced.

Ryan Aeronautical Co.—**Bruce Smith** has been appointed to the position of Director of Engineering.

Link Aviation. Inc.—Vice-President **Philip S. Hopkins** has announced his resignation.

Danly Machine Specialties, Inc.—**Walter J. Barz** has retired as Treasurer of the company. He is continuing as a Director.

Rinshed-Mason Co.—**Edward S. Hawkins** has been assigned general manager of the company's western div. factory and warehouse in California.

Northrop Aircraft, Inc. — **Lee H. Smith** has been appointed customer field service manager.

Kaiser-Frazer Corp.—The election of **William W. Monahan** as vice-president of industrial relations has been announced. The resignation of **Robert A. Graney**, who was formerly vice-pres. in charge of industrial relations, has been announced.

Fairchild Engine & Airplane Corp.—**Arthur E. Focke** has been appointed head of the Chemistry and Metallurgy Dept. of the company's NEPA Div.

The White Motor Co.,—**Joseph E. Adams** has been named director of purchasing and planning.

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Machine Tool Builders

(*Continued from page* 54)

under the impact of the national defense program. Representatives of NPA were present to participate in the proceedings. The main objective of the group was to encourage the re-establishment of an official Machine Tool Div. in the NPA set-up to provide centralized control of all machine tool allocations and scheduling. D. M. Pattison, vice-president, Warner & Swasey, refreshed the group on the operation of Priority E-1-b, the machine tool control order, operated by WPB in World War II. It was recommended that this order be reactivated quickly to provide an orderly control of machine tool allocations among military and civilian requirements.

Other moves by NPA are imperative at this time because NPA Regulation 2, dealing with the "DO" priorities for defense orders, does not cover machine tool requirements specifically.

It was pointed out too that in addition to specific defense requirements, the government has in effect the machine tool pool order which started out as a $750-million program, and which will be expanded as soon as revision of the program can be effected. The final action of the group was the appointment of an Executive Committee which will be available when called upon by commerce. It may be noted that the group is a voluntary organization, and is intended to supplement the Advisory Committee on machine tools to be established by NPA.

Studebaker Engine

(*Continued from page* 41)

One of the major characteristics of the combustion chamber is the clearance between the top of the piston and the top of the cylinder bore. With the current 7 to 1 compression ratio, the piston is stopped appreciably below the top of the cylinder. This clearance space will be useful as a factor in effective progressive increases in compression ratio.

Another interesting feature of cylinder head design is the equivalent of six studs per cylinder to assure secure

(*Turn to page* 80, *please*)

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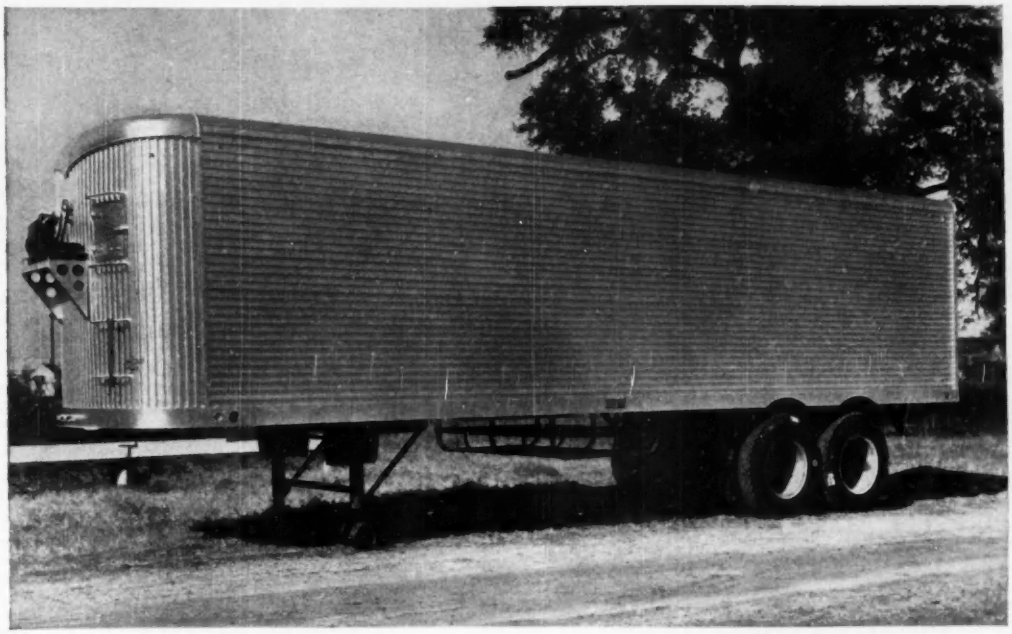

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fastening and freedom from leaks. Note, too, that studs enter bosses in the wall to provide ample bearing.

Connecting rods are of side-by-side type with an offset of 1/16-in., drop-forged of C-1141 steel. The lower end bearing is of interchangeable, precision type, steel-back and babbitt lined. Following Studebaker practice the pin is clamped in the rod with a wedge type bolt.

Pistons are of Lynite D-132 alloy, cam-ground, with T-slot and full skirt. They are fitted with three Sealed Power rings—two compression rings; one oil ring, the latter being of steel inner ring design. For service the piston and rod assembly is removed from above.

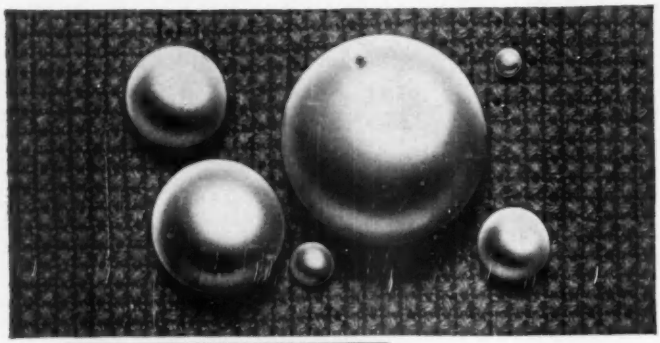
The carburetor is a 1⅛ in. Stromberg AAUVB-26 of dual downdraft type. A major feature of the induction system is the development of individual porting in the intake manifold, providing a single independent branch to each cylinder. Among the other accessories are Stromberg automatic choke, and AC fuel pump and fuel filter.

Full pressure lubrication is supplied to all points including the overhead valve gear. The oil pump is of spiral gear type, of larger capacity than on the previous model. A Floto oil strainer is used at the inlet to the oil pump for added protection.

The cooling system is served by a centrifugal pump, containing a mechanical type seal and ball bearing shaft mounting. A feature of the pump is the integral body casting containing both inlet and outlet branches to each bank of cylinders at the front of the block. The thermostat is of bellows type and the system contains a standard by-pass for circulation at all times. Water jacketing is full length around cylinder bores.

This engine uses a Delco-Remy distributor with full automatic vacuum advance, mounted at the rear end. Firing order is as follows: 1-8-4-3-6-5-7-2.

a metal ball PROBLEM?



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Evaluating Fuels

(*Continued from page* 51)

present engine characteristics and design trends, considerable doubt may be thrown on the value of the results. After considerable preliminary testing to be assured that the air consumption of the engine with the various cylinder heads was satisfactory over the whole speed range and that the brake horsepower was in line with the engine size and compression ratio, full-throttle power and fuel consumption tests were run at speeds from 800 to 4000 rpm; the results are shown in Fig. 1. These data were obtained using a maximum-power air-fuel ratio of about 13 to 1 and maximum-power spark advance with a non-knocking fuel.

When it had been ascertained that throughout the range of compressions ratios under investigation the performance characteristics of the engine were representative of present production designs, knock-limited fuel requirements in terms of primary reference fuels blends or of tel in isooctane were determined over the speed range at each compression ratio. Fuel data are presented in terms of octane number, isooctane plus tel (for values in excess of 100 octane number), and in Army-Navy performance numbers.

Engine dynamometer knock ratings were obtained by the Borderline method. The engine speed was held constant, fuel system purged, reference fuel inducted, and ignition timing advanced to produce incipient or trace knock. When all test fuels had been rated at one speed, the procedure was repeated at the next speed after the engine had reached equilibrium. In all knock ratings the carburetor air temperature was maintained at 100F plus or minus three deg, jacket-water outlet temperature at 175F plus or minus two deg, and the oil-sump temperature at 180 to 200F depending on engine speed.

Primary reference fuel blends in five octane-number increments and blends of leaded isooctane in 0.25 ml tel per gal increments were used to obtain a borderline framework for the 10 to 1 compression-ratio heads. Iso-speed lines result when ignition timings for borderline knock are plotted against Army-Navy performance number at a

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given engine speed. Upon this framework the ignition timings, either maximum power or any desired distributor curve, may be plotted and the performance-number requirement for each speed thereby determined.

This procedure is illustrated in Fig. 2, where the heavy solid line is the so-called normal distributor curve which indicates the engine requirement over the speed range with this ignition timing. Also, ignition timings to produce trace knock on the test fuels at the various engine speeds may be plotted in the same manner and the engine rating of these fuels thus obtained. Experience has shown that this method of handling borderline knock data produces more satisfactory results than the more conventional plots of ignition timing against engine speed when dealing with the higher compression ratios and higher octane numbers, since no interpolation is necessary in the analysis of the data.

The requirement throughout the speed range is shown in Fig. 3, and the effect of compression ratio on the requirement at the speed of maximum knock is shown by the maximum power curve in Fig. 4. These data are all based on the ignition timing for maximum power with the carburetor set to give maximum power (approximately 13 to 1 air-fuel ratio). Automotive engines, however, are not usually operated at a spark advance for maximum power, but are retarded considerably at the low speeds and a lesser amount as the speed is increased.

With a normal distributor setting throughout the series of compression ratios tested, the requirement is considerably reduced at the speed of maximum knock, as shown in Fig. 4. Requirements of the engine over the speed range with the modified spark advance at all ratios are illustrated in Fig. 5 in which the data indicate the potential

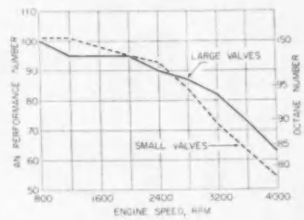

Fig. 6—Effect of valve size on performance number requirement. It may be noted that the heads equipped with small valves require more performance numbers than the larger valves up to a speed of about 2600 rpm.

value of an engine of this type to study fuels either for present engines, or for possible future high-compression engines. Compression ratios can be selected to evaluate the fuels under investigation without the necessity of resorting to abnormal ignition timings.

Some indication of both the desirability and the value of this type of investigation for fuel development work is indicated by a series of tests run at 10 to one compression ratio. The 10 to one heads used for this part of the investigation were the original design with the small intake and exhaust valves. First a comparison was made under the same test conditions to determine the requirement of both the large and small valve designs in the 10 to one compression-ratio cylinder heads, so as to indicate how improved volumetric efficiency might affect the engine requirement. This comparison is shown in Fig. 6. The heads equipped with the small valves require more performance numbers than the heads with the larger valves up to a speed of about 2600 rpm. Heads equipped with large valves gave an increase of eight bhp at 3200 rpm, and this increase indicates the reason for the higher requirement at engine speeds over 2600 rpm.

The foregoing article is an abstract of a paper "Evaluation of Motor Fuels for High-Compression Engines" which was presented by the authors at the 1950 SAE National West Coast Meeting held in Los Angeles.

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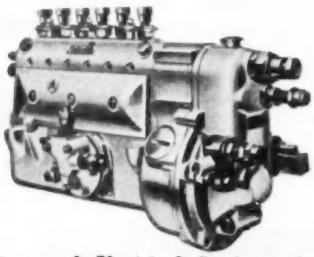

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Designing Cars for Economy and Performance

(*Continued from page 43*)

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Riding characteristics of a road vehicle are not affected by the weight, but by the load distribution, the height of the *CG* above the ground, the relative suspension frequencies, and the wheelbase. The ideal riding condition is expressed by the equation:

$$ab = \rho^2$$

where ρ is the radius of gyration of the car; a and b are the distances from the *CG* to the front and rear axles respectively. With a very light car, however, the load variation from empty to full load is certainly more sensible as a percentage of total weight so that a special study of the suspension problem is necessary in order to keep spring frequencies within comfortable limits for all practical load conditions. In this connection a considerable number of satisfactory variable rate suspensions have already been developed, many of them of simple and inexpensive design. Furthermore, this type of suspension is desirable for any type of vehicle, light or heavy, because it is the only one which gives a constant frequency springing.

The development of a very light automobile undoubtedly will require extensive research and a great amount of work, for it is much easier to design automobiles with no consideration of the weight factor. The consequence of this is that we add to the growing number of heavier passenger cars on the road, some of them weighing over two tons, with larger and heavier power units required to maintain performance figures.

Research and development costs involved in a program of substantial weight reduction are paid back in a very short time by the resulting material savings. For instance, on a basis of 200,000 cars manufactured a year, with a saving of only 100 lb per car, $2 million could be saved annually. Although practically, it appears of less importance than manufacturing and selling considerations, economy may be regarded as a feature which will permit the accomplishment of desirable performance with an appreciable gain in fuel consumption.

The real achievement of a technical improvement is the result of a more efficient operation with less energy required to do a job. The trend toward higher efficiencies does not mean automobiles with 150, 200 or 300 hp engines, but cars capable of higher performance, i. e., greater acceleration and higher speed, in the most desirable conditions of comfort and safety.

The most effective method of improving performance lies, unquestionably, in a study of the problem as a whole and the development, based on the selection of characteristics for best performance and economy, of the entire car. Though a difficult job, requiring time and money, it remains the unique way possible to bring automobile technique out of their present state of routine, and to guide the designs of the future toward more scientifically advanced conceptions, in accordance with the basic principle of the most efficient use of energy.

Engineers are still discussing the important question of automobile streamlining. Some technicians, however, are arriving at the surprising conclusion that there is very little difference in the performance of present-day streamlined cars and older cars having body shapes common in the last two decades. Others point out that the advantages of streamlining appear only at very high speeds, i. e., at speeds above those actually used on the roads.

(*Turn to page 86, please*)

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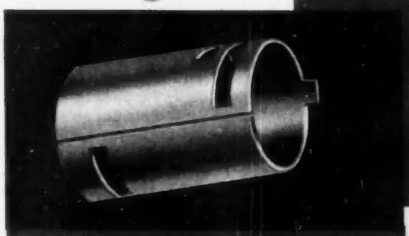
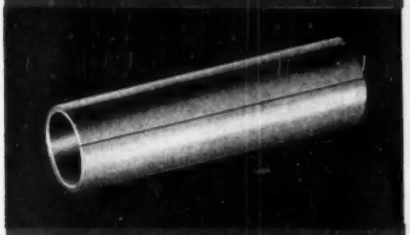
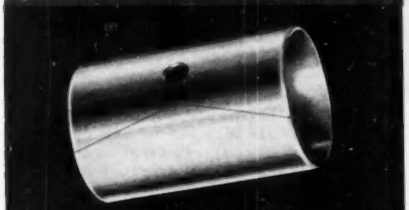


BRONZE ON STEEL



BABBITT ON STEEL



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These two points of view are not only open to question but contradict general observations and the results of considerable research performed by eminent engineers in the U. S. and in Europe. The studies of the aerodynamics of passenger cars carried out in Europe, had as their main object the reduction of required engine power by suitable design or body forms.

It seems desirable that the basic necessities established by these studies guide automobile engineers toward more functional designs. A considerable work is still necessary to improve present automobile aerodynamics, especially in details such as heavy moldings, improperly streamlined front-ends, excessive protuberences, etc. A new "styling philosophy" should take in consideration the technical factors of this important problem.

Stylists have been skeptical of aerodynamic conceptions in automobile design, though they are designing, in the meantime, streamlined toasters, irons, radios, refrigerators, food mixers, etc. In spite of their aversion to aerodynamics, however, the stylists have done much for the better streamlining of passenger cars. Of course, all American automobiles currently being produced cannot be regarded from the standpoint of pure aerodynamics as fully streamlined; they represent, nevertheless, a remarkable step toward features well conceived aerodynamically. This is illustrated by the fact that in spite of their greater weight and frontal area, their low pressure tires and 10 to 25 per cent increase in power over prewar cars, they realize a fuel economy of 15 to 25 per cent better than cars produced before the war. This is partly due to the higher thermal efficiency of present-day engines, but the major part of this fuel saving can be explained only by the improved body forms from the point of streamlining. This fact constitutes probably the best answer to those who are skeptical of the advantages provided to automobiles by aerodynamic design.

Is a substantial fuel saving actually desired by the majority of motorists? Gasoline is relatively abundant and available at low price in the U. S. and a few other fortunate countries. There is a basis for believing that 80 per cent of the world's automobile owners are not too interested in the problem of fuel economy at the present. But likely an increasing number of motorists will be concerned with the gas mileage of their cars, and would without doubt prefer really economical automobiles if the choice were given them. So, it seems unreasonable to declare that the public has no interest in fuel consumption. In a period of history where mankind is so intensely concerned with energy problems, it appears a contradiction against simple logic to waste systematically huge quantities of the available fuel-energy due to inefficiency.

Disregarding the economical aspect of the question and examining it purely from the technical standpoint, passenger car design is not really satisfactory at the present in that it cannot be considered as representing a perfected product. No doubt automobile engineers are capable of a very valuable job with reference to design improvement. The need of more economical automobiles is obvious and the growing demand of the public is necessary to impose it on the manufacturers.

No doubt fuel economy can readily be improved by the adoption of a design aerodynamically correct. By radically streamlining in accordance with the latest developments in automobile aerodynamics, a drag reduction of 40 per cent on passenger cars is possible. However, the corresponding fuel economy under average driving conditions will remain far below this figure in proportion, probably 15 per cent, unless a simultaneous and substantial weight reduction is realized.

Weight reduction can be accomplished by one or a combination of three ways: Weight saving within conventional design; through unconventional design; by the use of lighter materials. These savings can be accomplished only by patient development work. Each single part, each subassembly, has then to be carefully checked from the standpoint of the strength of the materials,

(*Turn to page* 88, *please*)

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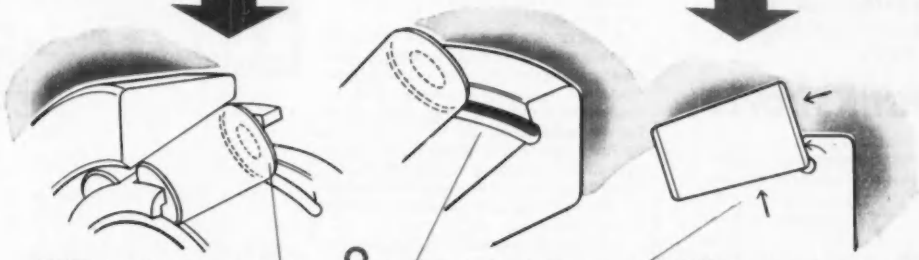

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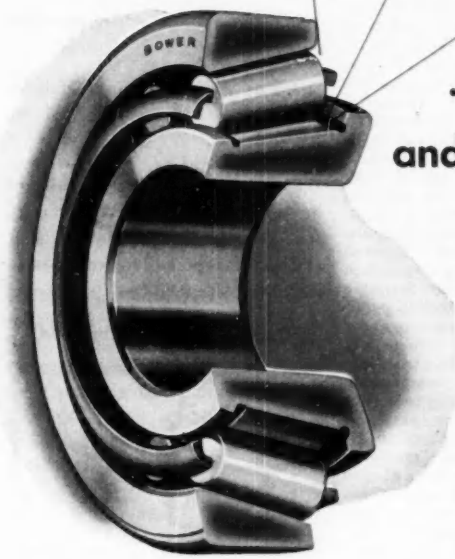

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in order to determine the amount of metal which can be saved within reasonable safety limits. If an effective saving in total weight is accomplished by this means, two different possibilities may be considered: reduction of engine power with unchanged performance, or slightly increased performance with the same engine power. The first solution is actually the most economical, for a primary weight saving will allow further size reductions in tires, brakes and engines, with a resulting additional weight decrease, which is called a secondary weight saving. Moreover, a certain reduction in cost also is obtained.

A more effective way of obtaining notably greater savings in weight is by means of what may be called unconventional automobile design, for instance, by employing such features as front-wheel drive, lighter suspension, lighter engines with greater power output, monocoque body construction, etc. Obviously, best results will be obtained by a combination of all these features in a design.

From an examination of the requirements to be met in obtaining a maximum weight reduction employing radically new design and using suitable materials, it seems improbable that additional weight savings can be achieved with ferrous metals commonly used in automobiles built today. Maximum reduction can be secured by the extensive use of aluminum alloys. Practically all parts or assemblies that are made of steel, cast iron, zinc, bronze, etc., can be produced of aluminum.

Aluminum and its alloys must be regarded from the standpoint of their inherent merits as high quality structural materials capable of affecting considerable improvement in automobile design, and not merely as substitutes for steel or other heavy metals. Aluminum alloys possess physical, chemical, and thermal properties which will provide certain highly desirable qualities for various automobile parts. For instance, an aluminum cylinder block, cylinder head and pistons will allow greater heat dissipation than cast iron, and thus higher compression ratios. Aluminum connecting rods running directly on surface hardened crankshaft journals, contribute to effective oil cooling, besides providing substantial weight reduction of the reciprocating parts. Aluminum brakes and brake drums dissipate heat efficiently and in addition reduce unsprung weight, and light metal wheels also contribute to the reduction of unsprung weight and to better cooling of tires. Moreover, lighter wheels improve acceleration, provide smoother steering and longer tire life. Aluminum radiators have greater cooling capacities. Mufflers made of aluminum are corrosion proof and cool exhaust gases better, and light alloy gas tanks and fuel systems are corrosion proof. Aluminum transmission and differential housings

(*Turn to page 89, please*)

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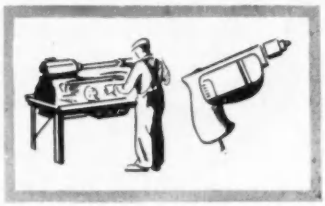

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There are in addition a great number of minor items such as hardware, interior molding, instrument clusters, headlamps, tail-lights, etc., which can be made of aluminum and subjected to special finishing processes like anodizing or polishing, instead of chrome plating. Selection of suitable alloys for each particular part must result from close cooperation between automotive and aluminum development engineers. Each individual part must be the subject of special study and designed functionally.

Most of the time the aluminum version of a part ordinarily made of steel will have a different appearance, because strength and manufacturing considerations often require basic changes in design. When redesigning a steel or cast iron part in aluminum, engineers generally consider first proportionate increase in section thicknesses. Although the modulus of elasticity of aluminum is one-third that of steel and two-thirds that of cast iron, substitution of material in certain cases is possible without any change in the design; in other cases a slight increase in dimensions, for greater moment of inertia, is sufficient to allow the change of materials. The most efficient procedure to obtain maximum strength and stiffness consists, however, in complete redesign of the part utilizing the proper alloy.

Thus, important development work is required for the design of each detail, of each part. This of course takes considerable time and requires special knowledge and experience in the field of application of aluminum alloys.

It is to be pointed out that a partial use of aluminum alloys in automobiles, for items such as doors, hood, fenders, or some minor parts, will not guarantee an important weight reduction. Some 150 lb saving might result at a relatively high additional cost, but the gain in miles per gallon will be hardly 4 per cent. Under these circumstances the partial use of aluminum in automobiles is an uneconomical practice, and therefore unadvisable.

The only possible way to obtain the maximum saving in weight is offered, undoubtedly, by the extensive use of light alloys, by the all aluminum automobile.

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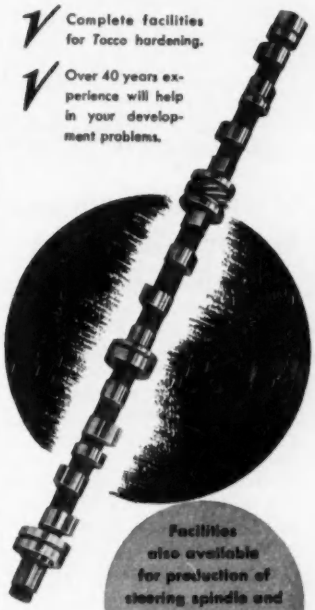

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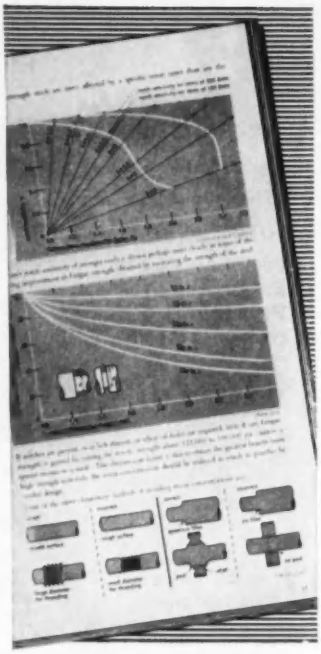

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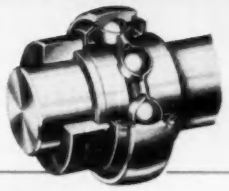

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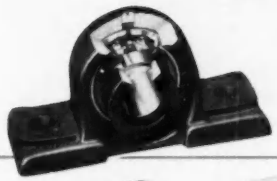

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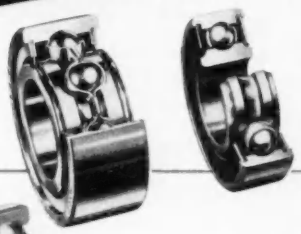

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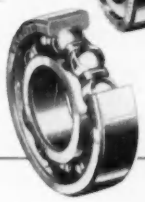

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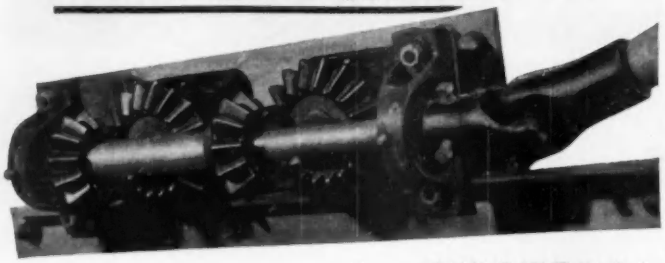

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Precision FORGED-TOOTH gears eliminated failures of cast-tooth, cast-iron gears on the heavy duty material loader drive shown above. Costs were 50 per cent less than for commercially cut gears.

If you use gears for bevel differentials, farm machinery drives, construction and road machinery or similar slow speed applications, it will pay to investigate FORGED-TOOTH gears. Send blueprints or samples of gears you are now using for comparative application, performance and cost analysis.

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Publications Available

(*Continued from page 62*)

L-106 Bearing Designs

Reliance Electric & Engineering Co. —Pre-lubricated bearing design is the subject of Bulletin B-2201. The illustrated folder contains descriptive sketches, cutaway drawings of the improved double shielded bearings and their bracket mounting.

L-107 Flame Hardening Equipment

Air Reduction—A new flame hardening apparatus catalog has been announced. Descriptions and illustrations of the company's latest flame hardening equipment are given.

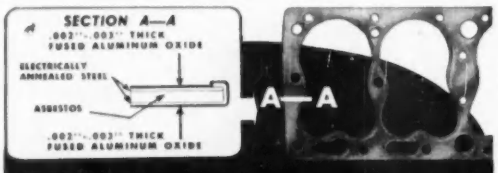
Fageol Super Freighter

(*Continued from page 37*)

gal tank. The 12-v electrical system employs an Exide battery, a Delco starting motor, and either a 25-amp Delco generator or a Leece-Neville alternator.

Three transmissions, Spicer, Clark, and Brownies, and three rear axles, Timken, Clark, and Eaton, will be offered.

They are built around a variety of Fruehauf models and body types.



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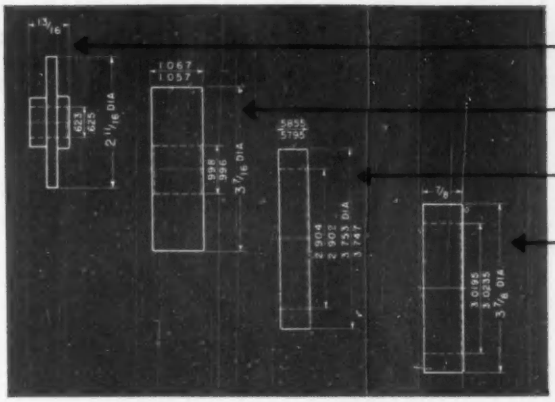


82.9% Material: C-1117 Steel
Acme-Gridley Model M Time: 36 sec.
Time by Previous Method: 3-1/2 min.

82.4% Material: C-1022 Steel
Acme-Gridley Model M Time: 58 sec.
Time by Previous Method: 5-1/2 min.

73.3% Material: C-1117 Seamless Tubing
Acme-Gridley Model M Time: 24 sec.
Time by Previous Method: 1-1/2 min.

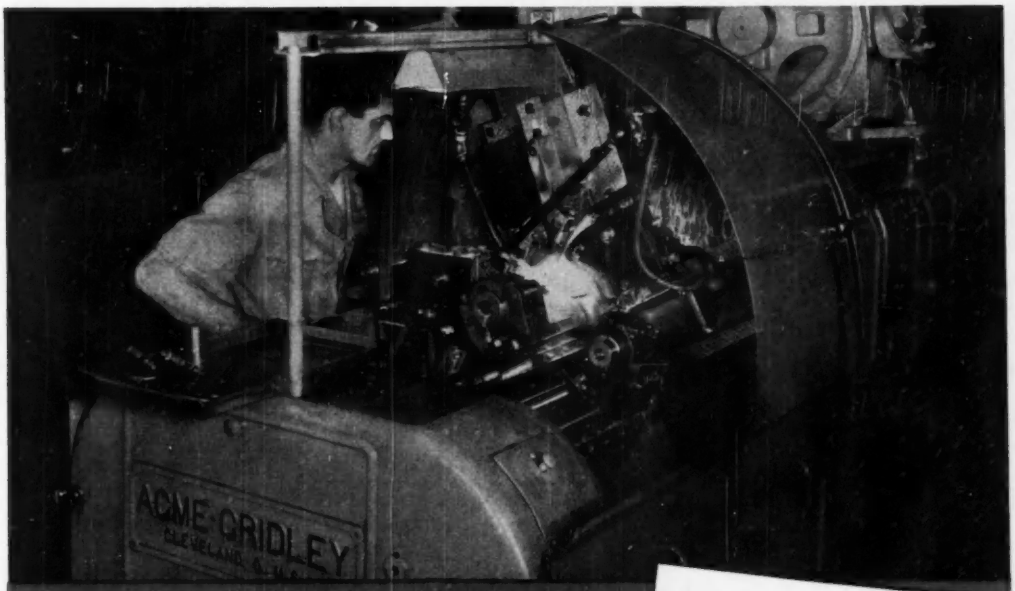
74.2% Material: B-1112 Steel
Acme-Gridley Model M Time: 1 min. 33 sec.
Time by Previous Method: 6 min.

These four jobs, done with an average saving of more than 75% of former machining time, are typical of the new Acme-Gridley Model M Single Spindle Automatic's performance.

Eight independently operated slides permit use of the speeds and feeds best suited to each cut, taking full advantage of the latest carbide-tipped tooling methods. You can get the right surface speed for a wide range of diameters through utilization of the three automatic spindle speed ranges.

These are but two of the basic design advantages that make this new Model M Acme-Gridley Automatic your best bet for increased production and lowered costs. For complete details ask for Bulletin M-50.

A metal-working manufacturer must look upon re-equipment as a continuing function. Otherwise, he's on the defensive, competitively speaking—and that doesn't score any touchdowns, goals or runs.



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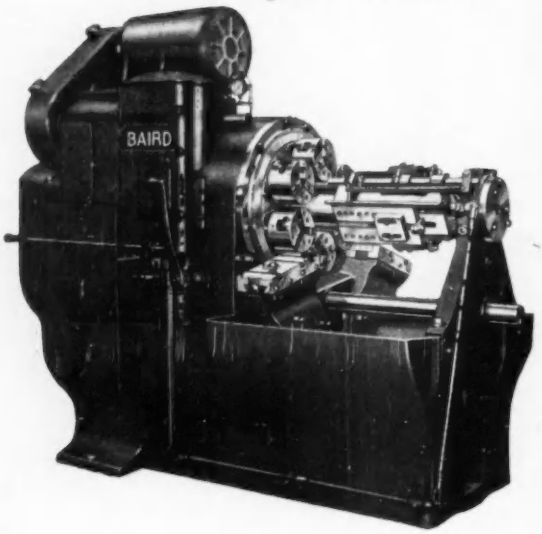
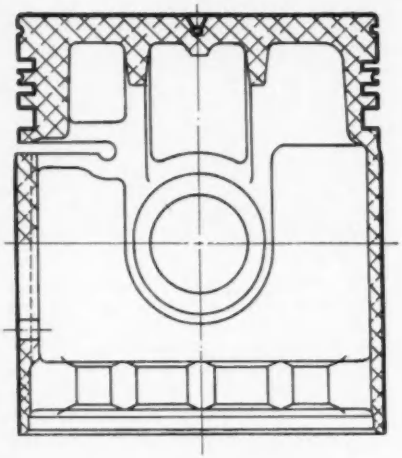
Elliptical TURNING

The mechanical drawing opposite is of a 3 5/16" by 3¾" long aluminum alloy piston. It was held in a mechanically operated draw back pin type chuck and centered on a previously finished land, inside the skirt of the piston.

The piston was rough and finish turned at the skirt end; elliptical O.D.; DOME and 5 grooves and dome centered and grooves chamfered.

243 per hour





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  The longitudinal tool slides may have different strokes and the cross slides are independent and have their strokes, all as best suits the job. All tool slides have micrometer adjustment.
- **DIFFERENT SPEEDS AT SPINDLES**
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- **AUTOMATIC CHUCKING**
  Operator has both hands free to handle the work. No levers or handles to require his attention or take his time.
- **ATTACHMENTS**
  Several readily applied attachments are available to perform extra operations and reduce handling, thus speeding production.
- **AUTOMATIC MECHANICAL STOP**
  Stops machine at end of each cycle if operator has not unloaded and reloaded in the proper operation of machine. This and other safety features make for least loss due to damage and for greatest safety.

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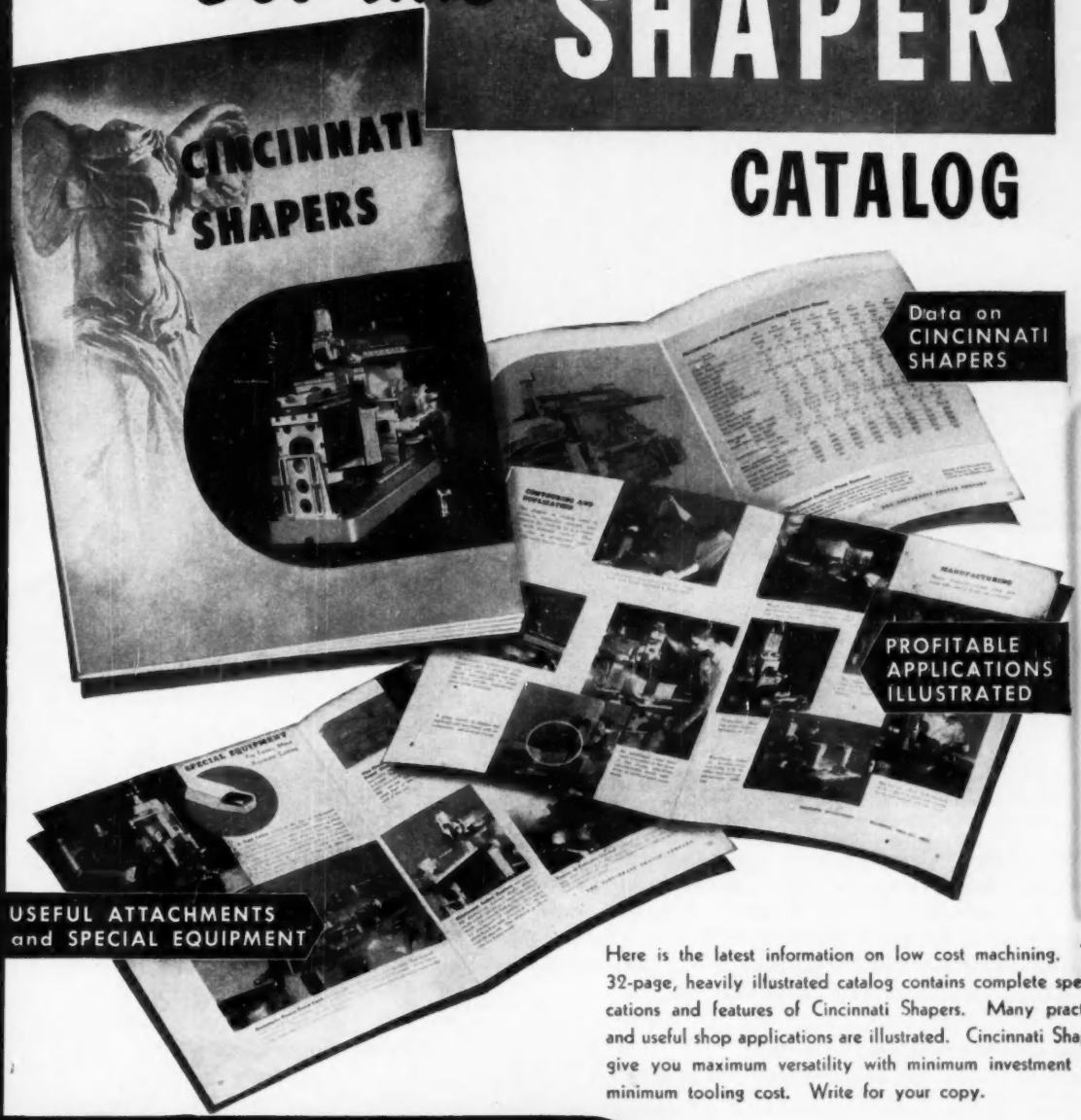

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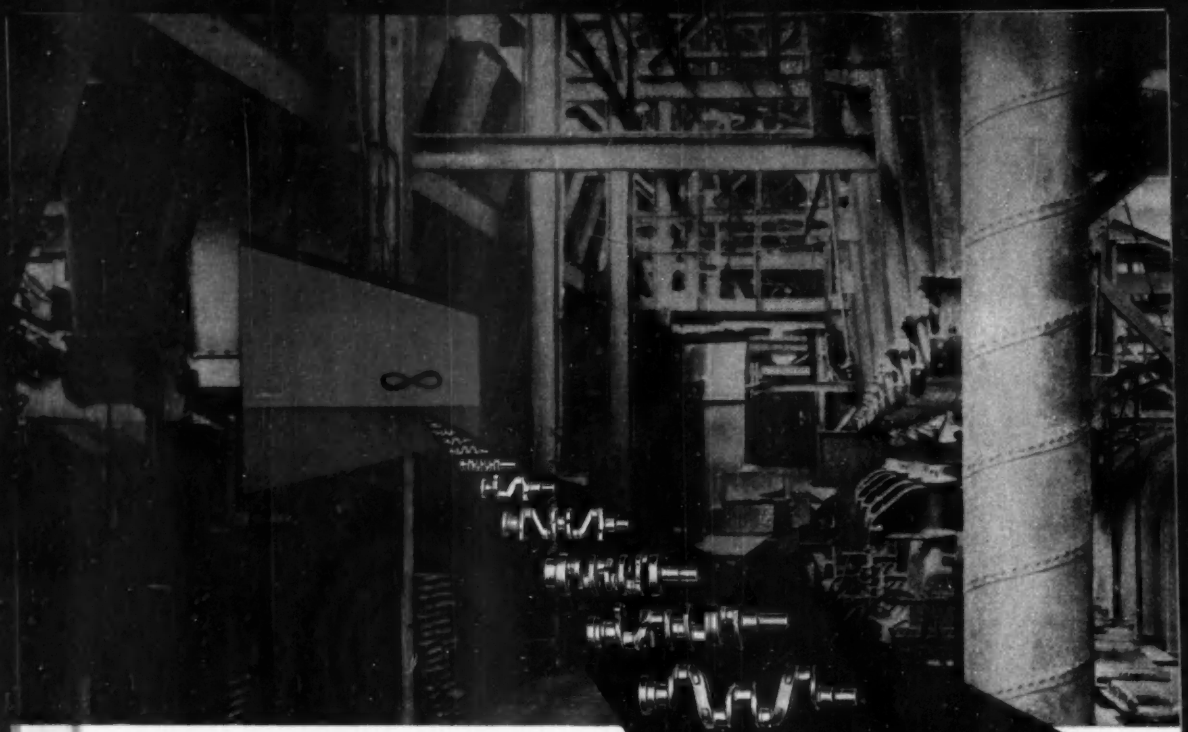

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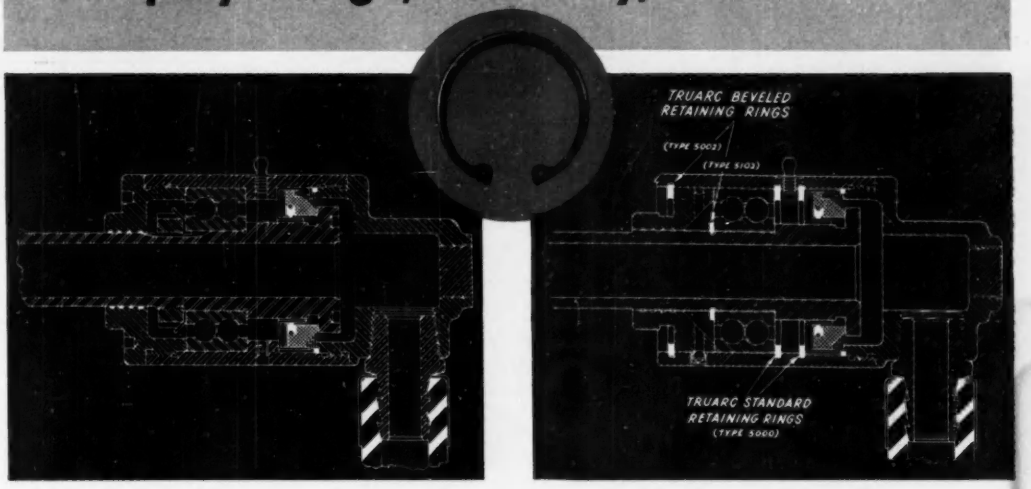

Conventional Way. This design died on the drawing boards, because the Deublin Company, Northbrook, Ill., found the simplified design, using Truarc Rings, superior and more economical.

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eliminated bearing lock nut and washer	.18
	.97
Machine operations eliminated	
Bore, undercut, and tap cap end of housing	.39
Locate cap on arbor, and chase threads	.28
Drill spanner wrench holes	.10
Cut thread on rotor for lock nut	.09
Mill slot in thread for tang on lock washer	.18
Drill spanner wrench holes in rotor	.10
	1.14
Assembly operations eliminated	
Install lock washer, tighten lock nut, bend lug	.20
Assemble cap into housing	.10
	.30
TOTAL SAVINGS	$2.41

THE Deublin Union—a rotating joint for steam, air, or water—is simple, rugged, easy to service. 4 Waldes Truarc Rings hold entire unit together, permit simplified design, cut unit cost $2.41.

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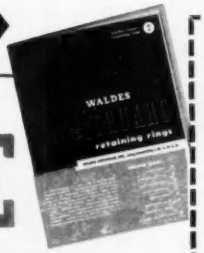

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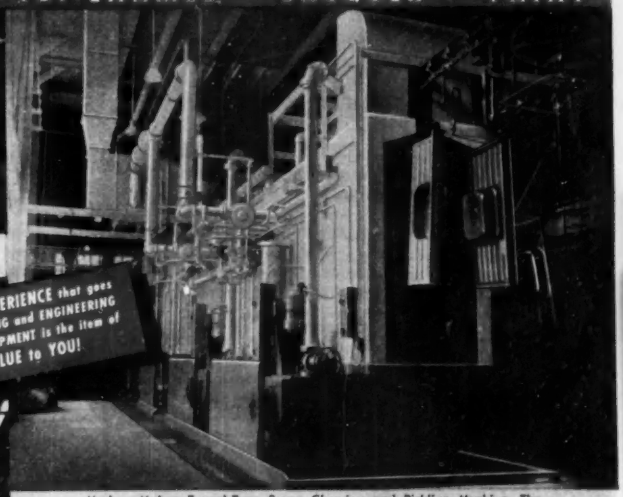

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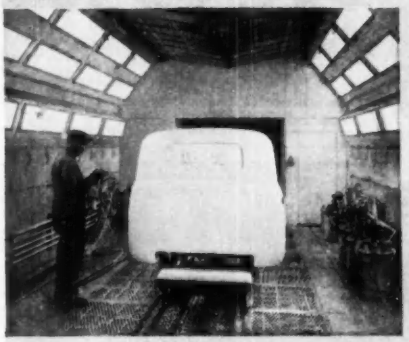

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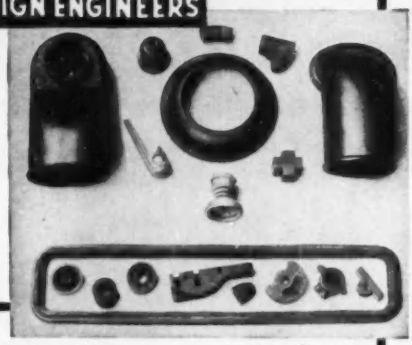

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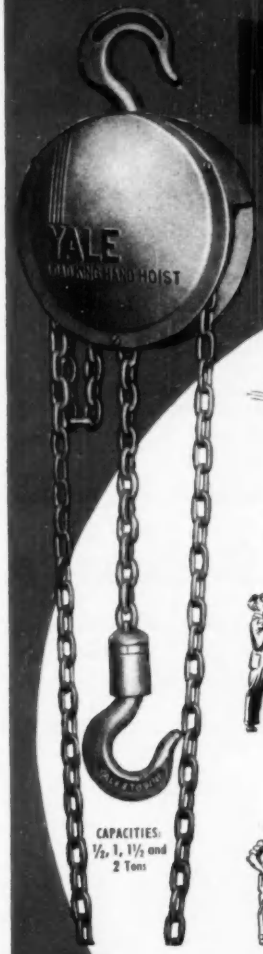

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1 Shear-Speed gear cutting. In which all teeth are cut simultaneously in a fraction of the time required by other cutting methods. Applicable to internal and external spur gears and splines (involute and other shapes)—also to other toothed-form parts, regular or irregular. (Some helicals, also, but not all.)

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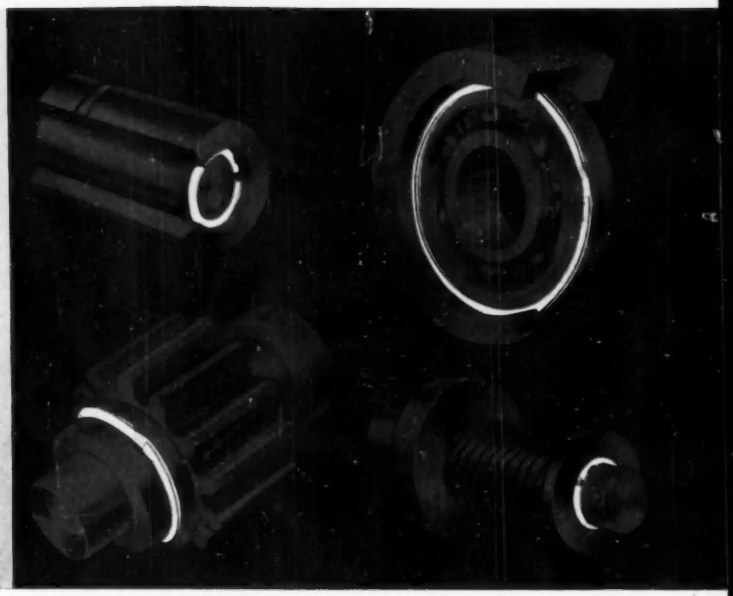
Spirolox saves machining • assembly time • parts • space • weight

SPIROLOX Retaining Rings Give You:

- **Manual installation** if desired—no special tools required to install or remove. *Re-usable*—especially valuable when machines are serviced in the field. Easily adapted to assembly line production with simple jigs.
- **Secure** positioning, permanent positioning, exact positioning, of moving parts.
- **Reduced** assembly time, reduction of parts, reduction of machining.
- **Simpler,** lighter, more compact product design.
- **Dynamic balance.** Full circularity; bearing surface all 'round.
- **Eye appeal.** Spirolox provides a uniform shoulder protrusion, without any irregularities.

YOU CAN'T AFFORD TO BE WITHOUT SPIROLOX ADVANTAGES!



Yours too!

A thousand machines need SpirOlox!

the better way to hold Moving Parts together . . .

When you spiral-in a Spirolox Retaining Ring, one more part is positioned precisely and locked securely. Due to its two-turn coil construction, Spirolox locks in the groove under thrust, will carry loads up to its full shear strength—will not jump out or squeeze out. Due to the lighter weight of Spirolox, centrifugal force does not tend to affect its locking characteristic.

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Write for this suggestive bulletin . . . **FREE**

imagine SpirOlox RETAINING RINGS *on Your product!*

gapless • concentric • requires no special tools • easy-in, easy-out • re-usable • stays put

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